

ENCLOSURE A

FOIA Request EPA-R5-2018-005656

Beg Doc	Custodian	Email From	Email To	Email Subject	File Name	File Size	Date-Time	Disposition	Exemption
EPA-R5-2018-0056560000001	Brown_Byron				Eco-Tech Seven Hills Aquatic Assessment_092217.pdf	6536823		Release in Full	
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ENCLOSURE B

FOIA Request EPA-R5-2018-005656

Disposition	Exemption Status	File Size
Withhold in Entirety	Deliberative Process; Ex. 5 - Civil Privileges	18399
Withhold in Entirety	Deliberative Process; Ex. 5 - Civil Privileges	16207
Withhold in Entirety	Deliberative Process; Ex. 5 - Civil Privileges	15015
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**AQUATIC ASSESSMENT REPORT
PROPOSED SEVEN HILLS SURFACE MINE
WARRICK COUNTY, IN**



Prepared for:

Peabody Energy
Lynnville, Indiana

Prepared by:

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September 2017





AQUATIC ASSESSMENT REPORT PROPOSED SEVEN HILLS SURFACE MINE WARRICK COUNTY, IN

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FIGURES

FIGURE 1 **Project Location Map**

APPENDICES

APPENDIX A	Representative Photographs
APPENDIX B	EPA RBP forms and supplemental stream habitat forms
APPENDIX C	Raw data (2017)-water chemistry, macroinvertebrates, fish
APPENDIX D	Data tables of previous survey effort (2011) - water chemistry, macroinvertebrates, fish

1. INTRODUCTION

Eco-Tech Consultants, Inc. (Eco-Tech) was contracted by Peabody Energy of Lynnville, Indiana to assess current aquatic conditions at a proposed surface mine in Warrick County, Indiana. The proposed site is within the Seven Hills Permit Area. Eco-Tech has previously performed an aquatic assessment at this location in 2011, along with several other ecological studies.

2. STUDY AREA

The project area is within the Southern Wabash Lowlands (U.S. Environmental Protection Agency [U.S. EPA] Level IV ecoregion). This area is characterized by an undulating landscape consisting of many wide, shallow valleys. Soils are neutral to acid ic, and originally the area was covered with oak-hickory forests on upland sites and mesophytic forests on lowland sites. Row crop agriculture and surface mining are prevalent land uses within the landscape surrounding the project area (Woods et al. 1998).

The site is bound on the north by Seven Hills Road (County Road 750 N) and to the south by Boonville-New Harmony Road (County Road 400 N) on the Daylight, Boonville, and Elberfeld, Indiana USGS Topographic Quadrangles. The permit area lies mostly within the western floodplain of Pigeon Creek. Various roads and trails occur throughout the project area (Figures 1). The total acreage of the site is 1,680 acres and is predominantly forest with some cropped areas and former mine impoundments.

Pigeon Creek is a fourth order tributary to the Ohio River. The stream's watershed drains approximately 225 square miles near the southern terminus of the project area (USGS, 2012). Pigeon Creek has been extensively channelized, and remnants of the original course exist as scrolling wetlands and oxbows visible on aerial imagery (Figure 1). The aquatic study area is within the Highland-Pigeon Creek drainage basin (HUC 05140202).

3. METHODS

Potential sample locations were identified using GIS data and knowledge of the site collected during previous studies, and three of the sites (AS1, AS2, and AS3) were previously sampled by Eco-Tech (2011b). Six potential sample locations with intermittent or perennial flow regimes were assessed to determine if suitable habitat was present to maintain aquatic assemblages that could be adequately sampled. Five of the proposed six sites contained flowing water at the time of sampling and were included in the survey: one site on an intermittent tributary stream and four sites on the mainstem of Pigeon Creek (one upstream of the proposed mine, one at the upper end of proposed mine, and two below the proposed mine area) (Figure 1). Proposed aquatic site 4 (AS4) did not have adequate stream flow to sample (Appendix A).

Eco-Tech collected information on stream habitat characteristics, water chemistry, and fish and benthic macroinvertebrate communities on August 28 -29, 2017 . Data collection was completed using the most current Indiana Department of Environmental Management (IDEM) standard operating procedures obtained from IDEM staff Ali Meils and Stacey Sobat (pers. comm., 8/23/2017).

3.1. Stream Habitat Description

Sample points were photographed and assessed according to the U.S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocol (RBP) for low -gradient streams and IDEM *Procedures for Completing the Qualitative Habitat Evaluation Index (QHEI) B-003-OWQ-WAP-XX-16-T-R0 Technical Standard Operating Procedure (2016)* by Eco-Tech staff . Drainage areas were delineated using the US Geological Survey web interface program StreamStats (v4.1.2; USGS 2012).

3.2. Water Quality Sampling

Water temperature, dissolved oxygen, and total dissolved solids were measured in the field with a handheld YSI 85 system (YSI Incorporated), and pH was measured with a pHTestr 1 (Oakton). Eco-Tech collected water samples for measurement of additional parameters and delivered them to Rosedale Services, Inc. in Boonville, Indiana. Levels of total iron, total manganese, acidity, alkalinity, and total dissolved solids were determined.

3.3. Macroinvertebrate Community Assessment

IDEM Aquatic macroinvertebrate sampling followed the protocol as defined in *Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0 Technical Standard Operating Procedure (2014)*.

Sweep samples were used to collect macroinvertebrates at each aquatic sample point . During the sweep sample, best professional judgment and experience were used to sample as many microhabitats (rootwads, emergent vegetation, woody debris, leaf packs, sandy and silty substrates, and cobble and gravel substrates) as possible, sampling these microhabitats in 1.5-2 meter intervals along 50 meters of shoreline habitat. Due to the fact that the streams are low gradient, and no substantial riffles were present at the proposed sample points, riffle kick samples were modified for short riffles, runs, and glides according to MHAB procedures.

Samples were elutriated, and placed into a white sorting tray. Samples were picked for 15 minutes, and the resulting subsample of invertebrates was preserved in 70 percent ethanol. Invertebrates were identified by Pennington and Associates, Inc. (Cookeville, TN) to “lowest practical taxon” as per IDEM guidance.

Taxa numbers were tabulated to calculate metrics used to produce the Indiana macroinvertebrate Index of Biotic Integrity (mIBI). The metrics were calculated using tolerance values, feeding groups, and habit behavior classifications provided by IDEM in their “Indiana Macroinvertebrate Taxa Attributes” document. Values were then assigned to a ranking system and summed to produce the mIBI according to instructions provided by IDEM in their “Calculating IDEM Macroinvertebrate Index of Biotic Integrity (mIBI)” document (provided by Ali Meils, IDEM Senior Environmental Manager).

3.4. Fish Community Assessment

Fish communities were sampled using a backpack electrofisher (Halltech Aquatic Research Inc. HT2000B/MK5) according to protocols designed by IDEM’s Surface Water Quality Assessment Program (provided by Stacey Sobat, IDEM Section Chief for the Probabilistic Monitoring Program). A length of stream equal to 1.5 times the stream width was sampled, ensuring equal and representative coverage of both banks. At least one individual per species, per site was preserved as a voucher specimen, as well as any unidentified specimens. All individuals were identified and enumerated by an Eco-Tech biologist familiar with low gradient stream fauna of southwest Indiana.

Taxa numbers were tabulated to calculate metrics used to produce an Index of Biotic Integrity (IBI). The metrics were calculated using sensitivity categories, trophic guilds, reproductive guilds, and additional classifications provided by IDEM in their document entitled “Appendix with Taxa Characteristics for IBI Calculations.” Values were then assigned to a ranking system and summed to produce the IBI according to instructions provided by IDEM in their document entitled “Interior River Lowland Calibration Summary” (provided by Stacey Sobat, IDEM Manager Section Chief for the Probabilistic Monitoring Program). Qualitative descriptors for IBI scores were provided by IDEM.

It should be noted that high levels of total dissolved solids were observed which can be problematic with electroshocking (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995). Typical voltage levels had to be reduced in order to prevent electrical overloading of the backpack unit. In order to offset this, additional time and surveyed area was added to the effort at each location. Fish seining was largely impossible due to the high accumulation of coarse woody debris anchored in the fine sediment.

4. RESULTS

4.1. Stream Habitat Description

Stream channels at all five sample sites have been altered by human activities. Pigeon Creek (sites AS1, AS3, AS5, and AS6) has been extensively channelized, and site AS2 is on a channel that appears to be a man-made conveyance built to drain a final cut impoundment from previous surface mining activities. EPA RBP habitat assessment and IDEM Qualitative Habitat Evaluation Index (QHEI) forms are provided in Appendix B. Stream characteristics are summarized in Table 1.

Sites on Pigeon Creek (AS1, AS3, AS5, and AS6) received lower RBP and QHEI scores than AS2 due to a lack of canopy cover, homogeneous fine substrate, and little development of diverse aquatic habitats. Sites AS5 and AS6 received higher QHEI scores than AS1 and AS3 primarily because of greater bank stability and habitat heterogeneity. Channel substrate at all sites is primarily silt/soil; however, a few isolated gravel deposits and areas of exposed hardpan comprised of clay and gravel were noted. Within the sections of Pigeon Creek surveyed, fine sediment bars were observed forming in the center of the stream channel. Sites AS1 and AS3 received scoring indicating impaired waterways. Photos of sample locations are provided in Appendix A.

Previous stream habitat analysis noted that stream AS1, AS2, and AS3 received EPA RBP scores of 126, 47, and 126, respectively. The scoring from previous years is similar to the current survey (Appendix D). Site AS2 did receive higher RBP scoring likely due to beaver impact having a stabilizing effect on flow regime and the progressive growth of woody vegetation within the riparian habitat in the years between survey years.

Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Flow Regime	Dominant		IDEM QHEI Score	EPA RBP Score
		Channel Material			
AS1	Perennial	Silt		46	112
AS2	Intermittent	Gravel		45	88
AS3	Perennial	Silt		48	102
AS5	Perennial	Gravel		53	96
AS6	Perennial	Silt		52	107

4.2. Water Quality Results

Physical and chemical parameters measured at the five aquatic sample sites are provided in Table 2. These measurements will provide monitoring data, which can be compared to previous conditions. Water quality standards for aquatic life in Ohio and Illinois River from Indiana's Administrative Code, Minimum Surface Water Quality Standards (327 IAC 2 -1-6), have a dissolved oxygen (DO) lower standard of 4.0 mg/L. All sample sites from this survey were at or below this standard, indicating a strong organic component in the system and lack of habitat and gradient to adequately oxygenate the water column.

Total dissolved solids (TDS) at all five sites are elevated. While IDEM does not have an aquatic life standard for TDS, elevated water salinity, as measured by specific conductivity and a dominant component of TDS, has been shown to negatively affect aquatic life in freshwaters (U.S. EPA 2016). This parameter may reflect anthropogenic land use influences in the watershed and may also be driven by a strong groundwater hydrologic influence. Although the survey data of TDS and DO indicate water quality may be at levels to cause stress to aquatic organisms, it was not determined if these results are from naturally occurring sources or from

anthropogenic effects. All other parameters were within typical water quality standards for unimpaired waterways.

Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1	AS2	AS3	AS5	AS6
Temperature (°C)	22.7	25.8	22.9	22.5	23.2
Dissolve Oxygen (DO)	4.00	3.80	3.90	3.87	4.05
pH	8.1	8.2	8	7.9	8.2
Total Dissolved Solids (mg/L)	1440	1100	2110	2230	2070
Total Acidity (mg/L as CaCo3)	<10	<10	<10	<10	<10
Total Alkalinity (mg/L as CaCo3)	313	280	256	344	255
Total Iron (mg/L)	0.16	<0.1	<0.1	<0.1	0.18
Total Manganese (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1
Total Suspended Solids (mg/L)	<10	<10	11.7	<10	23

Previous physical and chemical parameter by Eco-Tech (2011b) noted that total dissolved solids at sites AS1, AS2, and AS3 were noted to be high at the time of sampling. All other parameters fell within the water quality parameters of the time (Appendix D).

4.3. Macroinvertebrate Sampling Results

Previous macroinvertebrate sampling at AS1, AS2, and AS3 yielded a total of 241 individuals of 32 taxa. The most common taxa sampled at all three sites included clam shrimp (*Spinicaudata*), narrow-winged damselflies (*Enallagma* spp.), net-spinning caddisflies (*Cheumatopsyche* spp.), and riffle beetles (*Stenelmis* spp.) (Appendix D).

Macroinvertebrate from 2017 sampling effort yielded a total of 1,196 individuals of 77 taxa. Macroinvertebrate IBI scores ranged from 34 to 38, and IDEM considers streams scoring less than 36 to be impaired. All sites exhibited some level of stress to the faunal community making them borderline impaired reaches.

Higher metric scoring for individual sites in general resulted from low percentages of Orthocladiinae and Tanytarsini of Chironomidae, non-insects minus crayfish, and tolerant taxa. The low scores obtained for individual sites in general are the result of several indicators of poor stream health, including the number of EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa, percent shredders and scrapers, and percent collector filterers. The highest score was observed at AS3, and this is due to the fact that the greatest number of individuals and greatest percentage of intolerant taxa were collected there.

While more individuals and taxa were collected in 2017 than in 2011, the taxa observed did not exhibit a high quality macroinvertebrate community. Significant results common among all five sites included narrow-winged damselflies (*Enallagma* sp.), net-spinning caddisflies (*Hydropsyche* sp.), and various midge species (*Polypedilum illinoense* group and *Tanytarsus* sp.).

Taxa that occurred at four of the five sites include d small minnow mayflies (*Callibaetis floridanus*), dancer damselflies (*Argia* sp.), forktail damselflies (*Ischnura* sp.), net-spinning caddisflies (*Cheumatopsyche* sp.), and various midge species (*Dicrotendipes neomodestus* , *Glyptotendipes* sp., *Polypedilum flavum* , *Ablabesmyia mallochi*, *Conchapelopia* sp., and *Procladius* sp.) The most abundant species found at all five sites was *Polypedilum illinoense* group (n=220), and the most abundant species from the entire survey effort was *Cheumatopsyche* sp. (n=243; Appendix C). Some of the taxa (midges and damselflies) are commonly found in lentic habitats (pools) in vegetation, mud, debris, or rootwads, which are common in Pigeon Creek. The small minnow mayflies and net-spinning caddisflies, are often found in areas with more flowing water. Taxa richness was greatest at AS1, AS3, and AS5 most likely to greater habitat heterogeneity between riffle, pool, woody debris, root wad, and leaf pack habitat.

Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Taxa	34	3	20	1	34	3	32	3	30	3
Number of Individuals	216	3	212	3	123	1	495	5	150	3
Number of EPT Taxa	4	1	3	3	2	1	8	3	5	1
% Orthocladiinae + Tanytarsini of Chironomidae	3.2%	5	6.6%	5	4.1%	5	3.4%	5	6.7%	5
% Non-insects Minus Crayfish	7.9%	5	4.7%	5	5.7%	5	1.0%	5	10.0%	5
Number of Diptera Taxa	15	5	8	3	20	5	16	5	14	5
% Intolerant	29.6%	3	42.9%	5	0.0%	1	18.0%	3	14.7%	1
% Tolerant	6.5%	5	3.8%	5	14.6%	3	12.7%	3	8.0%	5
% Predators	18.5%	3	3.3%	1	29.3%	3	17.4%	1	22.0%	3
% Shredders + Scrapers	0.5%	1	0.5%	1	2.4%	1	2.2%	1	2.0%	1
% Collector-Filterers	39.4%	1	87.7%	1	13.8%	3	20.6%	1	28.0%	1
% Sprawlers	2.3%	1	0.5%	1	10.6%	5	3.4%	3	6.0%	5
Total Scores	36		34		36		38		38	

*<36=impaired, ≥36=unimpaired.

4.4. Fish Sampling Results

Previous sampling on Pigeon Creek (Eco-Tech, 2011b) indicated qualitative ratings of fair (AS1 and AS3) and poor (AS2), yielding a total of 295 individuals and 25 taxa. Channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) were found at all three sites. Other relatively populous species (>10 individuals) included black bullheads (*Ameiurus melas*), steelcolor shiners (*Cyprinella whipplei*), blackstripe topminnows (*Fundulus notatus*), and golden shiners (*Notemigonus chrysoleucus*), and two species known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in the 2011 survey is listed as

threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana (Eco-Tech 2011b; Appendix D).

In 2017, sampling yielded 17 fish species. IBI scores ranged from 17 to 24. Fish communities at four sample sites were classified as indicative of poor stream habitat and one site's community was classified as very poor (58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish). The low scores obtained at all five sites were caused by low overall species richness, low minnow species richness, no occurrences of sucker species or sensitive species, and low percentages of carnivorous or pioneer fish and simple lithophiles (fish that lay eggs on rocks). IBI scores for 2017 are lower than the previous survey (Appendix D). Lower fish diversity and number captured individuals could possibly be explained by higher water temperatures, which also increased the ambient conductivity (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995), and so fish bio-regulatory processes and behavior were adversely affected for electroshock sampling. The same backpack shocker and operator were used for both surveys. Fish seining to offset the reduction of captured fish was prevented by coarse woody debris distributed throughout the sites on Pigeon Creek.

Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Species	7	1	5	5	8	1	8	1	6	1
Number of Minnow Species	2	1	0	0	0	0	3	0	0	0
Number of Sunfish Species	4	1	3	3	4	1	1	1	3	1
Number of Sucker Species	0	0	0	0	0	0	0	0	0	0
Number of Sensitive Species	1	1	0	0	1	1	1	1	2	1
% Tolerant	30%	3	21%	5	39%	3	32%	3	0%	5
% Omnivore	17%	3	0%	0	0%	5	0%	5	0%	5
% Insectivore	0%	0	0%	0	0%	0	0%	0	0%	0
% Pioneer	N/A		17%	5	N/A		N/A		N/A	
% Carnivore	10%	1	N/A	0	17%	1	4%	1	10%	1
Total # Individuals	30	1	29	1	18	1	50	1	21	1
% Simple Lithophilic Individuals	0%	0	0%	0	0%	0	0%	0	0%	0
% Individuals with Deformities	0%	5	0%	5	0%	5	0%	5	0%	5
Totals	17		24		18		18		20	
Qualitative Rating	Very Poor		Poor		Very Poor		Very Poor		Very Poor	

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish

Green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and spotted bass (*Micropterus punctulatus*) were found at all three sites. These are habitat generalists, and green sunfish are especially tolerant of adverse habitat conditions, such as sedimentation and low oxygen. Relatively populous species (>8 total individuals) included steelcolor shiners (*Cyprinella whipplei*), mosquitofish (*Gambusia affinis*), warmouth (*Lepomis gulosus*), long-eared sunfish (*Lepomis megalotis*), suckermouth minnow (*Phenacobius mirabilis*), and bluntnose minnow (*Pimephales notatus*). These species are typical inhabitants of pools and vegetation beds of small to medium-sized tributaries of the Ohio River. To a certain degree, they are able to tolerate habitat conditions found in Midwestern low-gradient streams, including warm water temperatures, relatively low oxygen, sedimentation, and non-point source pollution. Only two species which are known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in this survey is listed as threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana.

5. SUMMARY

Streams within the project area display several indicators of disturbance and poor water quality. They have been subject to channelization and show very little development of instream habitat and stable substrate. Water quality measurements show significant stressors to aquatic life in the form of high dissolved solids and low dissolved oxygen. Fish and macroinvertebrate communities at all sites reflect a very tolerant aquatic assemblage that is adapted to low gradient streams with inadequate habitat and water quality issues.

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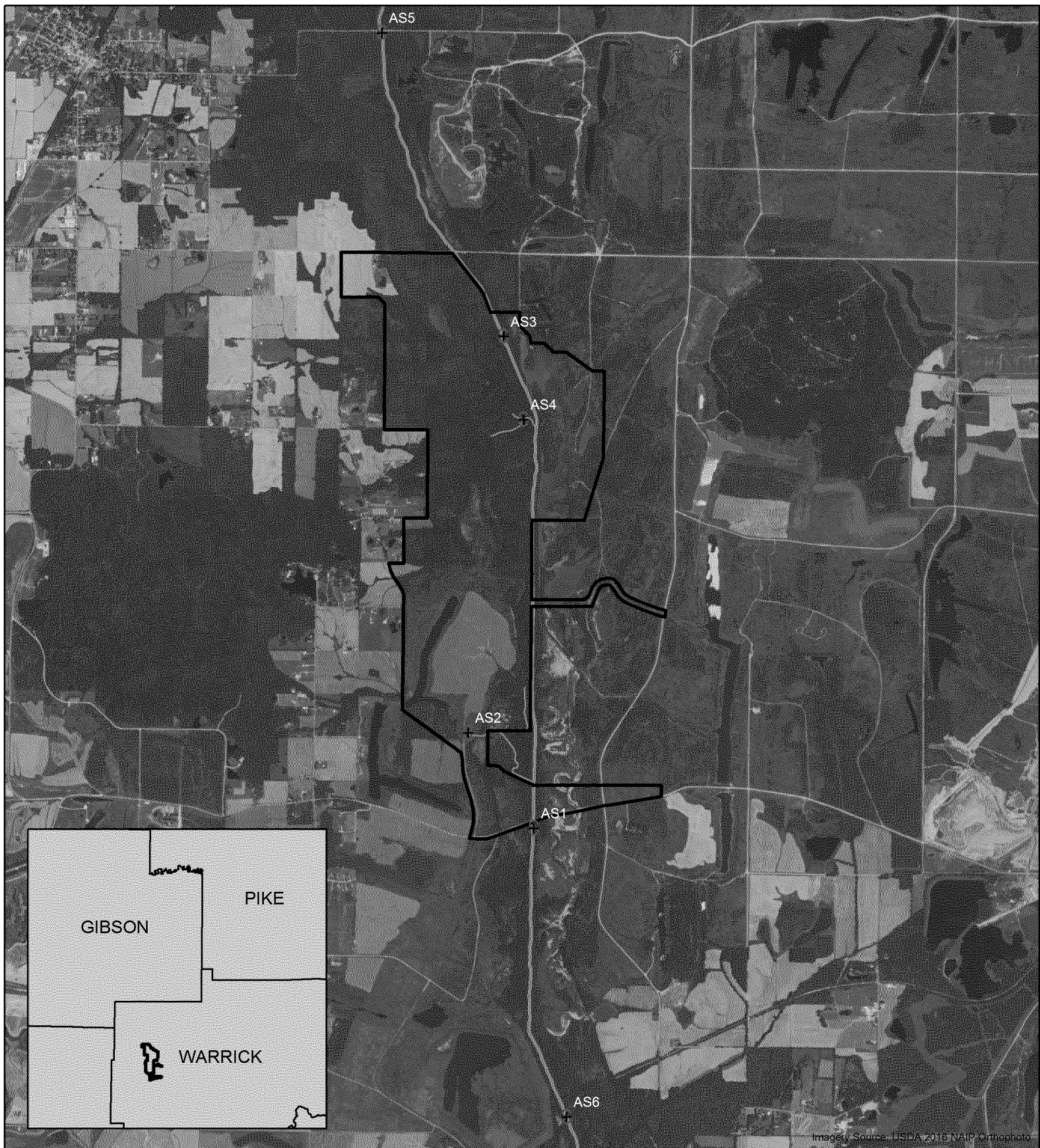
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FIGURES.

FIGURE 1: PROJECT LOCATION MAP



Legend

-  2017 Aquatic Sample Point
-  2017 Permit Boundary
-  Pigeon Creek


0 0.5 1
 Miles

Figure 1:

Aquatic Sample Points

Peabody Seven Hills Mine
 Warrick County, IN



Drawn by: RRN

Print Date: 9/15/2017

Project: LV2017025

APPENDIX A.

REPRESENTATIVE PHOTOGRAPHS



Photo 1. Sample point AS1 downstream view from bridge intersection



Photo 2. Sample point AS1 upstream view from bridge intersection



Photo 3. Sample point AS2 downstream view of pool habitat.



Photo 4. Sample point AS2 downstream view.



Photo 5. Sample point AS3 downstream view.



Photo 6. Sample point AS3 downstream view.

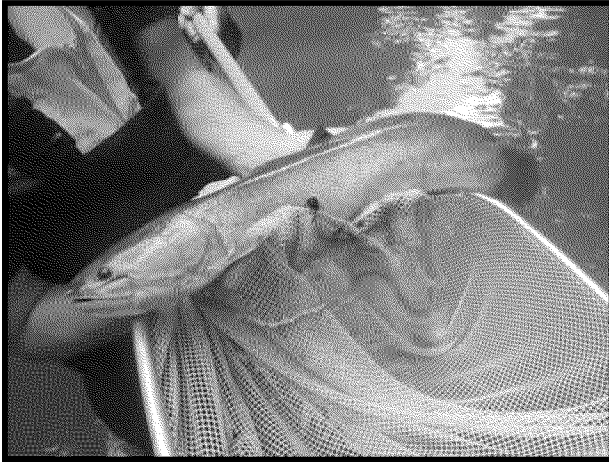


Photo 7. Bowfin (*Amia calva*) caught at AS3.



Photo 8. Sample point AS4 on survey date upstream view. Dry stream bed.



Photo 9. Sample point AS5 downstream view from underneath bridge.

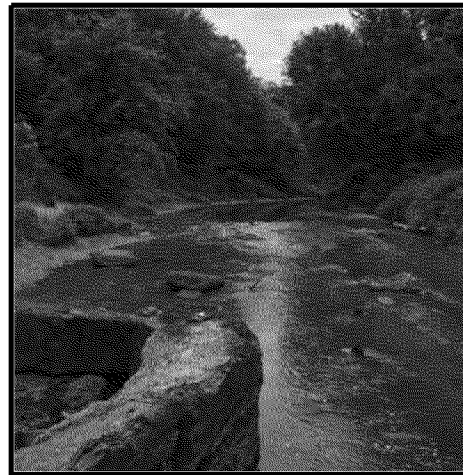


Photo 10 Sample point AS5 upstream view from underneath bridge. Showing clay hardpan.



Photo 11. Sample point AS6 downstream view.



Photo 12. Sample point AS6 upstream view.

APPENDIX B.

EPA RBP FORMS AND SUPPLEMENTAL STREAM HABITAT FORMS

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)							
IDEM	Sample #	bioSample #	Stream Name	Location			
	AS-1		Pigeon Creek	39.06617, -87.39377			
	Surveyor	Sample Date	County	Macro Sample Type	Habitat	QHEI Score:	
	Geo Tech	8/22/17	Warwick	MHAB, Fish	Complete	52	

1) SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

BEST TYPES	OTHER TYPES	ORIGIN	QUALITY
PRESENT TOTAL % P R <input type="checkbox"/> BLD/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5]	PRESENT TOTAL % P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0]	PRESENT TOTAL % P R <input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LAQUSTRINE [0] <input type="checkbox"/> SHALE [-1] <input type="checkbox"/> COAL FINES [-2]	Check ONE (Or 2 & average) S T F <input type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1] Substrate <input type="checkbox"/> EXTENSIVE [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> NONE [1] Maximum 20

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources ☐ 3 or less [0]

Comments

2) INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

% Amount	% Amount	% Amount	AMOUNT
12 UNDERCUT BANKS [1] 6 OVERHANGING VEGETATION [1] 20 SHALLOWS (IN SLOW WATER) [1] 1 ROOTMATS [1]	45 POOLS > 70cm [2] 1 ROOTWADS [1] 5 BOULDERS [1]	1 OXBOWS, BACKWATERS [1] 2 AQUATIC MACROPHYTES [1] 1 LOGS OR WOODY DEBRIS [1]	Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input type="checkbox"/> MODERATE 25-75% [7] <input type="checkbox"/> SPARSE 5-25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1] Cover Maximum 20

Comments

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> NONE [6] <input checked="" type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]	<input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1]

Channel Maximum 20

Comments

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE
L R <input type="checkbox"/> NONE/LITTLE [3] <input checked="" type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]	L R <input checked="" type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]	L R <input checked="" type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian.

Riparian Maximum 10

Comments

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0]	Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1]	<input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Pool/Current Maximum 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2] <input checked="" type="checkbox"/> BEST AREAS 5-10cm [1] <input type="checkbox"/> BEST AREAS < 5cm [metric = 0]	<input type="checkbox"/> MAXIMUM > 50cm [2] <input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> NONE [2] <input checked="" type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1]

Riffle/Run Maximum 8

Comments

6) GRADIENT (2.44 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

% POOL: 40 % GLIDE: 35 % RUN: 20 % RIFFLE: 5

DRAINAGE AREA (207.8 mi²)

Gradient Maximum 10

IDEM 07/06/10

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

Stream Drawing: AS1



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

AS1
(3rd NORTH)

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>12</u>	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>19</u>	20 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE <u>1</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE <u>8</u> (LB)	Left Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
SCORE <u>8</u> (RB)	Right Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0

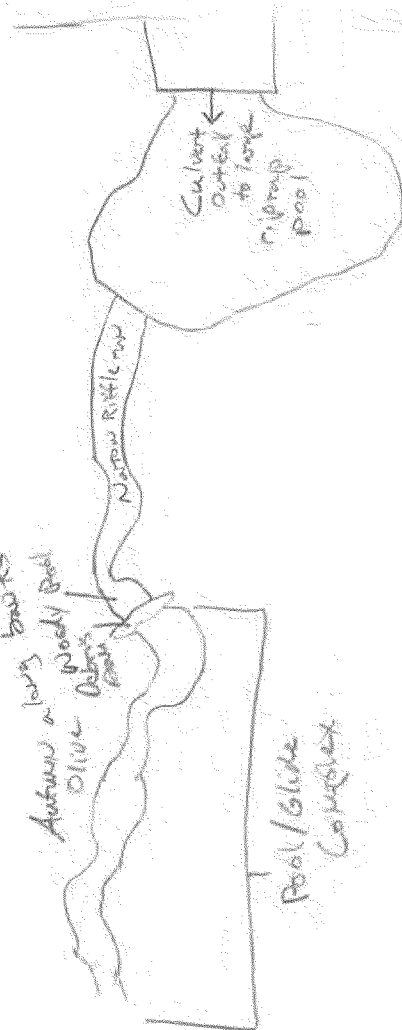
Total Score 112

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)									
COMMENT									
A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Public <input type="checkbox"/> Private	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES	<input type="checkbox"/> Area	<input type="checkbox"/> Depth	<input type="checkbox"/> Active <input type="checkbox"/> Historic	<input type="checkbox"/> Industry <input type="checkbox"/> Urban	
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input type="checkbox"/> Trash/Litter	<input type="checkbox"/> Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old	<input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime	<input type="checkbox"/> Pool: <input type="checkbox"/> > 100 ft ² <input type="checkbox"/> > 3 ft	<input type="checkbox"/> Spray <input type="checkbox"/> Islands <input type="checkbox"/> Scoured	<input type="checkbox"/> Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified	<input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill	
<input type="checkbox"/> 30% - < 55%	<input type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor	<input type="checkbox"/> Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks	<input type="checkbox"/> BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment	<input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling	<input type="checkbox"/> Eroded: <input type="checkbox"/> Bank <input type="checkbox"/> Surface	<input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon	<input type="checkbox"/> Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry	
<input type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits	<input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls	<input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant	<input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf	<input type="checkbox"/> Lawn <input type="checkbox"/> Home	<input type="checkbox"/> Atmospheric deposition	
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable	<input type="checkbox"/> Impondment <input type="checkbox"/> Desiccated	<input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table				
Looking upstream (> 10m, 3 readings: < 10m, 1 reading in middle); Round to the nearest whole percent									
% open	Left	Middle	Right	Total Average					
	%	%	%	%					
	X	X	X	X					

Stream Drawing: AS2



DEM 07/06/10

AS2
(4th North)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>8</u>	20 19 18 17 16	15 14 13 12 11	10 9 <u>8</u> 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>5</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<u>5</u> 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>12</u>	20 <u>19</u> 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>6</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	<u>6</u>	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>5</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	<u>5</u>	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>4</u> (LB)	Left Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
SCORE <u>4</u> (RB)	Right Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					

Total Score 88

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

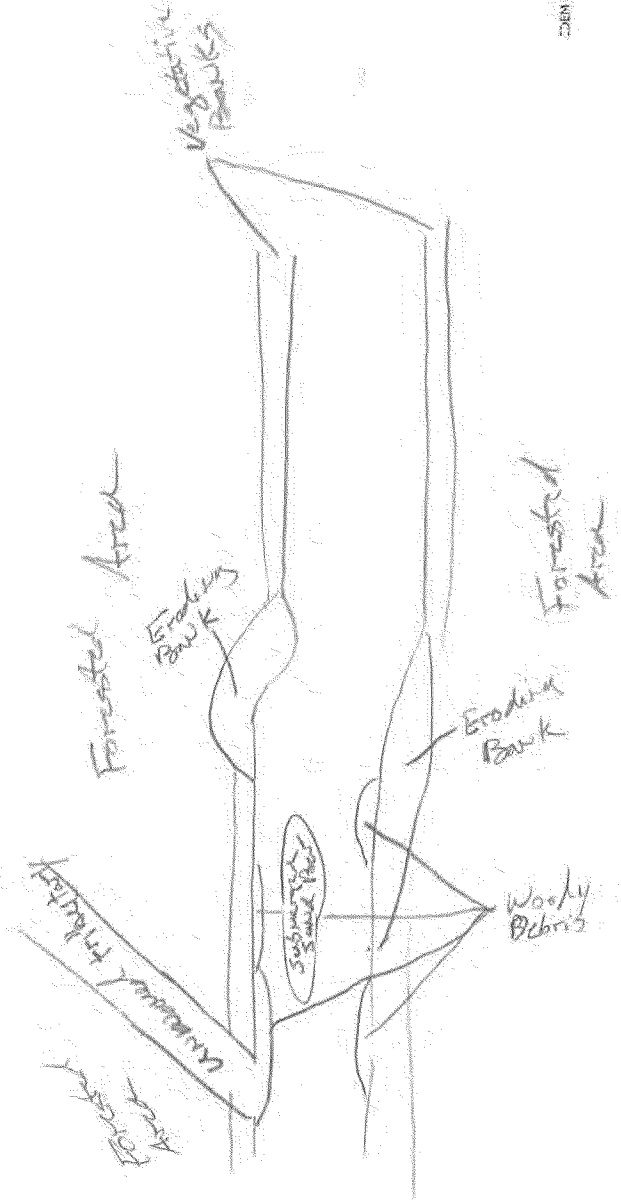
COMMENT _____

A-CANOPY	B-AESTHETICS	C-RECREATION	D-MAINTENANCE	E-ISSUES
<input checked="" type="checkbox"/> > 85% - Open <input type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input type="checkbox"/> Foam/Scum	Area <input type="checkbox"/> > 100 ft ² <input type="checkbox"/> > 3 ft Depth <input type="checkbox"/> > 3 ft Pool <input type="checkbox"/> > 100 ft ² <input type="checkbox"/> > 3 ft <input type="checkbox"/> Oil sheen <input type="checkbox"/> Trash/Litter <input type="checkbox"/> Nuisance odor <input type="checkbox"/> Sludge deposits <input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Active <input type="checkbox"/> Historic Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old <input type="checkbox"/> Spray <input type="checkbox"/> Islands <input type="checkbox"/> Scoured Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armoured <input type="checkbox"/> Slumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition

Looking upstream (> 10m, 3 readings < 10m, 1 reading in middle); Round to the nearest whole percent.

Left	Middle	Right	Total Average
%	%	%	%
X	X	X	X

Stream Drawing: A63



JDEM 07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <i>5</i>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<i>(5)</i> 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <i>8</i>	20 19 18 17 16	15 14 13 12 11	10 9 <i>(8)</i> 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <i>14</i>	20 19 18 17 16	15 <i>(14)</i> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <i>10</i>	20 19 18 17 16	15 14 13 12 11	<i>(10)</i> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <i>16</i>	20 19 18 17 <i>(16)</i>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>8</u>	20	19	18	17	16	15	14	13	12	11	10	9	<u>8</u>	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>1</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	<u>1</u>	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>5</u> (LB)	Left Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
SCORE <u>5</u> (RB)	Right Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					

Total Score 102

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

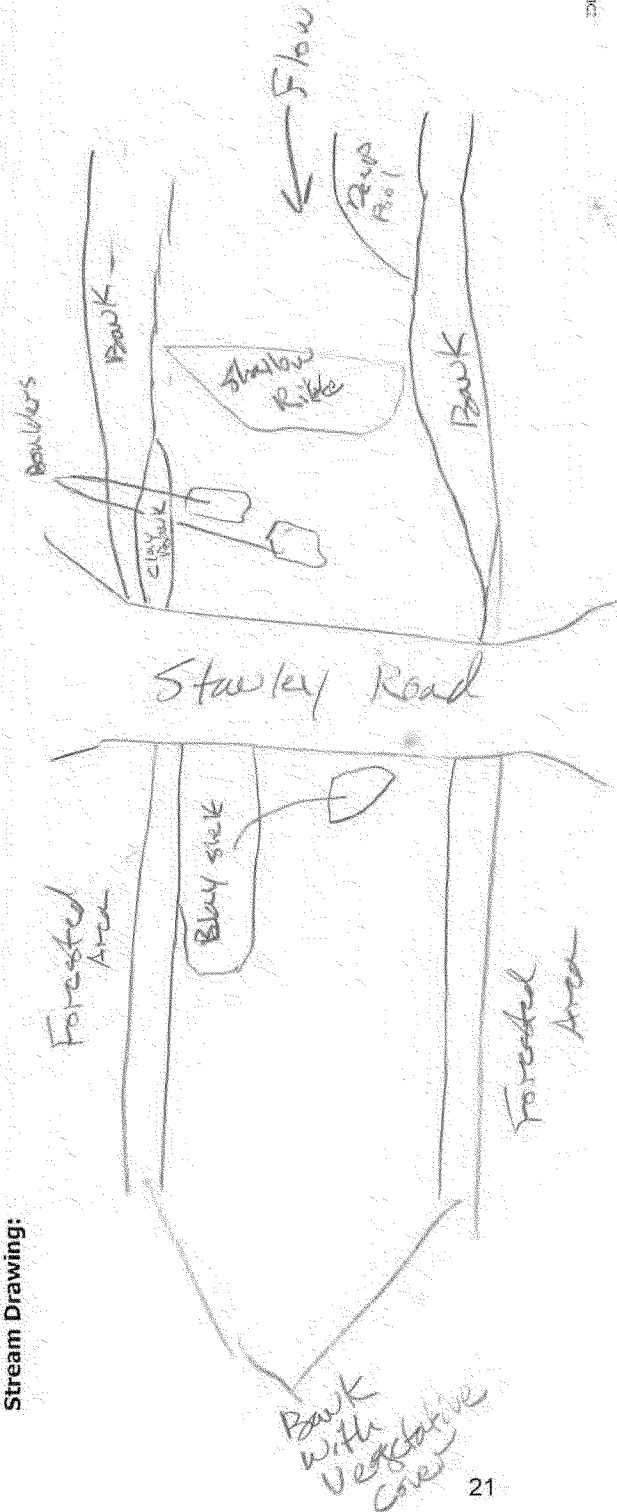
COMMENT _____

A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input type="checkbox"/> Trash/Litter	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill	<input type="checkbox"/> BMPs
<input type="checkbox"/> 30% - < 55%	<input type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor	<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Scoured	<input type="checkbox"/> Logging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling	<input type="checkbox"/> Erosion
<input type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits	<input type="checkbox"/> Snag	<input type="checkbox"/> Removed	<input type="checkbox"/> Modified	<input type="checkbox"/> Bank	<input type="checkbox"/> Surface	<input type="checkbox"/> False bank	<input type="checkbox"/> Mature
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Leveed	<input type="checkbox"/> One-sided	<input type="checkbox"/> Both banks	<input type="checkbox"/> Wash H ₂ O	<input type="checkbox"/> Tile	<input type="checkbox"/> H ₂ O Table	<input type="checkbox"/> Mine
			<input type="checkbox"/> Relocated	<input type="checkbox"/> Outfalls	<input type="checkbox"/> Bedload	<input type="checkbox"/> Moving	<input type="checkbox"/> Stable	<input type="checkbox"/> Impounded	<input type="checkbox"/> Desiccated
			<input type="checkbox"/> Flood control	<input type="checkbox"/> Drainage	<input type="checkbox"/> Flood control	<input type="checkbox"/> Drainage			

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent.

	Left	Middle	Right	Total Average
% open	XX	XX	XX	

Stream Drawing:



IDEN 07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION <u>AS 6 (North) → ACTUALLY AS 5</u>	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover: mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>4</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 <u>4</u> 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material; increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>16</u>	20 19 18 17 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																			
	Optimal					Suboptimal					Marginal					Poor				
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.				
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.				
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.				
SCORE 4 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.				
SCORE 8 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.				
SCORE 9 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
SCORE 9 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				

Total Score 96

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)																	
IDEM	Sample #	bioSample #	Stream Name	Location													
	AS-6		Pigeon Creek	38.06617, -87.30379													
	Surveyor	Sample Date	County	Macro Sample Type	Habitat Complete	QHEI Score: 52											
	Go Tech	8/22/17	Warwick	MHAB, Fish	Complete												
1] SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present. Check ONE (Or 2 & average)																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">BEST TYPES</th> <th style="text-align: left;">OTHER TYPES</th> <th style="text-align: left;">ORIGIN</th> <th style="text-align: left;">QUALITY</th> </tr> <tr> <td> PREDOMINANT P R <input type="checkbox"/> BLDR/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input checked="" type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5] </td> <td> PRESENT TOTAL % P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0] </td> <td> PRESENT TOTAL % P R <input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LACUSTRINE [0] </td> <td> Check ONE (Or 2 & average) S I T <input checked="" type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1] </td> </tr> </table>										BEST TYPES	OTHER TYPES	ORIGIN	QUALITY	PREDOMINANT P R <input type="checkbox"/> BLDR/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input checked="" type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5]	PRESENT TOTAL % P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0]	PRESENT TOTAL % P R <input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LACUSTRINE [0]	Check ONE (Or 2 & average) S I T <input checked="" type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1]
BEST TYPES	OTHER TYPES	ORIGIN	QUALITY														
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NUMBER OF BEST TYPES: <input type="checkbox"/> 4 or more [2] <input type="checkbox"/> 3 or less [0] (sludge from point-sources)																	
(Score natural substrates; ignore sludge from point-sources)																	
Comments																	
2] INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">% Amount</th> <th style="text-align: left;">% Amount</th> <th style="text-align: left;">% Amount</th> <th style="text-align: left;">% Amount</th> </tr> <tr> <td> <input checked="" type="checkbox"/> UNDERCUT BANKS [1] <input checked="" type="checkbox"/> OVERHANGING VEGETATION [1] <input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] <input checked="" type="checkbox"/> ROOTMATS [1] </td> <td> <input type="checkbox"/> POOLS > 70cm [2] <input type="checkbox"/> ROOTWADS [2] <input type="checkbox"/> BOULDERS [1] </td> <td> <input type="checkbox"/> OXBOWS, BACKWATERS [1] <input type="checkbox"/> AQUATIC MACROPHYTES [1] <input type="checkbox"/> LOGS OR WOODY DEBRIS [1] </td> <td> Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input type="checkbox"/> MODERATE 25-75% [7] <input type="checkbox"/> SPARSE 5-25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1] </td> </tr> </table>										% Amount	% Amount	% Amount	% Amount	<input checked="" type="checkbox"/> UNDERCUT BANKS [1] <input checked="" type="checkbox"/> OVERHANGING VEGETATION [1] <input checked="" type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] <input checked="" type="checkbox"/> ROOTMATS [1]	<input type="checkbox"/> POOLS > 70cm [2] <input type="checkbox"/> ROOTWADS [2] <input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> OXBOWS, BACKWATERS [1] <input type="checkbox"/> AQUATIC MACROPHYTES [1] <input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input type="checkbox"/> MODERATE 25-75% [7] <input type="checkbox"/> SPARSE 5-25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1]
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Comments																	
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">SINUOSITY</th> <th style="text-align: left;">DEVELOPMENT</th> <th style="text-align: left;">CHANNELIZATION</th> <th style="text-align: left;">STABILITY</th> </tr> <tr> <td> <input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1] </td> <td> <input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1] </td> <td> <input checked="" type="checkbox"/> NONE [6] <input type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1] </td> <td> <input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1] </td> </tr> </table>										SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY	<input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1]	<input checked="" type="checkbox"/> NONE [6] <input type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]	<input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1]
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Comments																	
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">River right looking downstream</th> <th style="text-align: left;">RIPARIAN ZONE</th> <th style="text-align: left;">FLOOD PLAIN QUALITY</th> <th style="text-align: left;">CONSERVATION TILLAGE</th> </tr> <tr> <td> L R <input checked="" type="checkbox"/> NONE/LITTLE [3] <input type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1] </td> <td> L R <input checked="" type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0] </td> <td> L R <input type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0] </td> <td> L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0] </td> </tr> </table>										River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE	L R <input checked="" type="checkbox"/> NONE/LITTLE [3] <input type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]	L R <input checked="" type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]	L R <input type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0]
River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE														
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Indicate predominant land use(s) past 100m riparian.																	
Comments																	
5] POOL/GLIDE AND RIFFLE/RUN QUALITY																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">MAXIMUM DEPTH</th> <th style="text-align: left;">CHANNEL WIDTH</th> <th style="text-align: left;">CURRENT VELOCITY</th> <th style="text-align: left;">Recreation Potential</th> </tr> <tr> <td> Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0] </td> <td> Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0] </td> <td> Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1] </td> <td> Check ONE (Or 2 & average) <input type="checkbox"/> SLOW [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> EDDIES [1] </td> </tr> </table>										MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential	Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0]	Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1]	Check ONE (Or 2 & average) <input type="checkbox"/> SLOW [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> EDDIES [1]
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Indicate for reach - pools and riffles.																	
Comments																	
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:																	
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">RIFFLE DEPTH</th> <th style="text-align: left;">RUN DEPTH</th> <th style="text-align: left;">RIFFLE/RUN SUBSTRATE</th> <th style="text-align: left;">RIFFLE/RUN EMBEDDEDNESS</th> </tr> <tr> <td> <input type="checkbox"/> BEST AREAS > 10cm [2] <input type="checkbox"/> BEST AREAS 5-10cm [1] <input checked="" type="checkbox"/> BEST AREAS < 5cm [metric = 0] </td> <td> <input checked="" type="checkbox"/> MAXIMUM > 50cm [2] <input type="checkbox"/> MAXIMUM < 50cm [1] </td> <td> <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0] </td> <td> <input checked="" type="checkbox"/> NONE [2] <input type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1] </td> </tr> </table>										RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS	<input type="checkbox"/> BEST AREAS > 10cm [2] <input type="checkbox"/> BEST AREAS 5-10cm [1] <input checked="" type="checkbox"/> BEST AREAS < 5cm [metric = 0]	<input checked="" type="checkbox"/> MAXIMUM > 50cm [2] <input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input checked="" type="checkbox"/> NONE [2] <input type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1]
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Comments																	
6] GRADIENT (2.64 ft/mi) <input type="checkbox"/> VERY LOW - LOW [2-4] <input checked="" type="checkbox"/> MODERATE [6-10] <input type="checkbox"/> HIGH - VERY HIGH [10-6]																	
DRAINAGE AREA (22.5 mi ²) <input type="checkbox"/> VERY LOW - LOW [2-4] <input checked="" type="checkbox"/> MODERATE [6-10] <input type="checkbox"/> HIGH - VERY HIGH [10-6]																	
%POOL: 70 %GLIDE: 30 %RUN: X %RIFFLE: X																	
Comments																	

IDEM 07/08/10

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES		
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input checked="" type="checkbox"/> Trash/Litter	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban			
<input type="checkbox"/> 30% - < 55%	<input checked="" type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor	Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old		<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime			
<input checked="" type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits	<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Scoured	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill		
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls	Srag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified		<input type="checkbox"/> BMPs	<input type="checkbox"/> Construction	<input type="checkbox"/> Sediment		
			Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks		<input type="checkbox"/> Logging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling		
			Relocated <input type="checkbox"/> Cutoffs		<input type="checkbox"/> Erosion	<input type="checkbox"/> Bank	<input type="checkbox"/> Surface		
			Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable		<input type="checkbox"/> False bank	<input type="checkbox"/> Manure	<input type="checkbox"/> Lagoon		
			Armoured <input type="checkbox"/> Stumps		<input type="checkbox"/> Wash H ₂ O	<input type="checkbox"/> Tile	<input type="checkbox"/> H ₂ O Table		
			Impounded <input type="checkbox"/> Desiccated		<input type="checkbox"/> Mine	<input type="checkbox"/> Acid	<input type="checkbox"/> Quarry		
			Flood control <input type="checkbox"/> Drainage		<input type="checkbox"/> Flow	<input type="checkbox"/> Natural	<input type="checkbox"/> Stagnant		
					<input type="checkbox"/> Wetland	<input type="checkbox"/> Park	<input type="checkbox"/> Golf		
					<input type="checkbox"/> Lawn	<input type="checkbox"/> Home	<input type="checkbox"/> Atmospheric deposition		

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

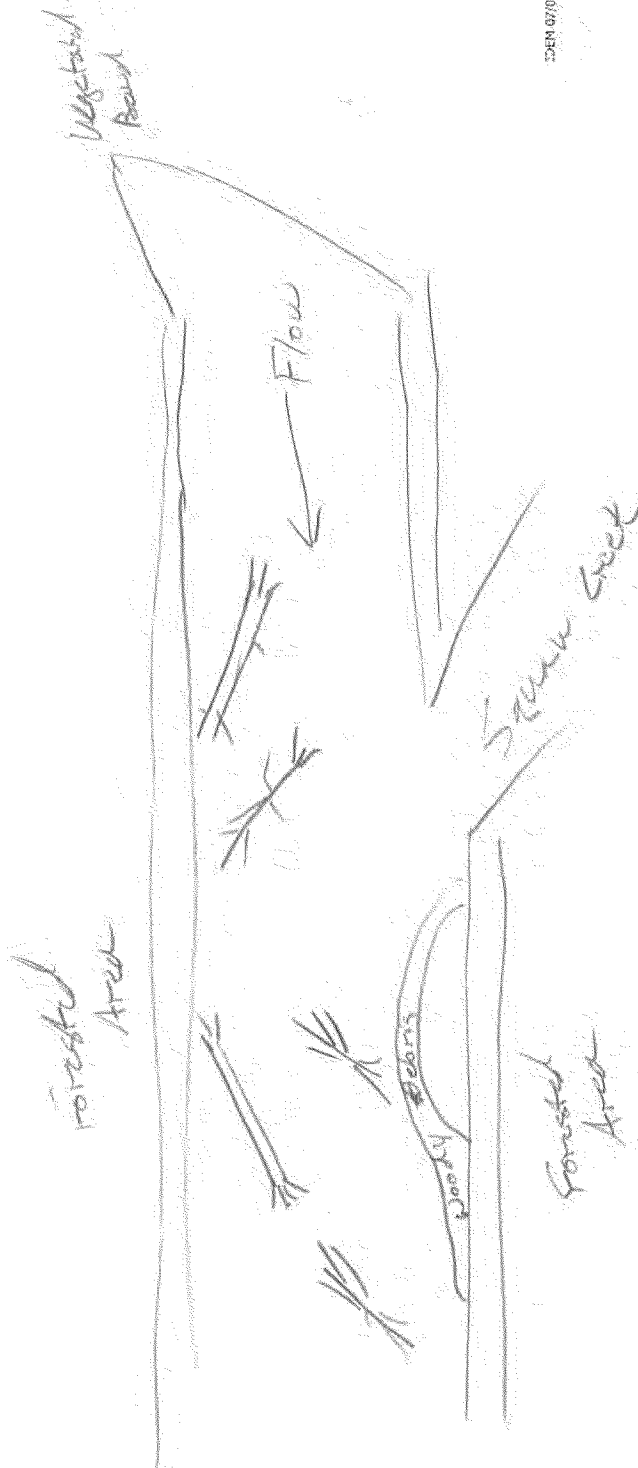
% open	Left	Middle	Right	Total Average
	_____ %	_____ %	_____ %	_____ %

X

X

X

Stream Drawing: AS 6



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

A56
(5/24/2018)

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME _____ PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>4</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 <u>4</u> 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>9</u>	20 19 18 17 16	15 14 13 12 11	10 <u>9</u> 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>16</u>	20 19 18 17 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present; usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE <u>1</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE <u>7</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>7</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE <u>8</u> (LB)	Left Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
SCORE <u>8</u> (RB)	Right Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE <u>10</u> (LB)	Left Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0
SCORE <u>10</u> (RB)	Right Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0

Total Score 107

APPENDIX C.

RAW DATA-WATER CHEMISTRY, MACROINVERTEBRATES, FISH



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-01
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-1

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	313 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.16 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-02
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-2

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	280 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-03
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-3

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	256 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	11.7 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-05
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-6

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	255 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.18 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	23.0 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-04
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-5

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	344 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by

Raw Macroinvertebrate data collected 8/28-29/2017 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

AQUATIC SITE				AS1	AS2	AS3	AS5	AS6
DATE				8/29/17	8/29/17	8/29/17	8/28/17	8/29/17
SPECIES	T.V.	F.F.G.	Habit					
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae								
<i>Girardia (Dugesia) tigrina</i>					1			
MOLLUSCA								
Bivalvia								
Veneroida								
Corbiculidae								
<i>Corbicula fluminea</i>	6	FC		8				6
Gastropoda								
Basommatophora								
Physidae								
<i>Physella sp.</i>	8	SC		1		1		
ANNELIDA								
Oligochaeta	8	GC	bu					
Clitellata								
Tubificida								
Naididae								
Naidinae								
<i>Nais pardalis</i>	8	GC			1			
Tubificinae w.o.h.c.	10	GC	bu	1	1		3	
Pristininae								
<i>Pristina sp.</i>	8	GC			1			
<i>Pristina aequiseta</i>	8	GC			3			
Rhyacodrilinae								
<i>Branchiura sowerbyi</i>	6	GC	bu		3		1	
ARTHROPODA								
Arachnoidea								
Acariformes								
Oribatei								
							1	
Crustacea								
Amphipoda								
Talitridae								
<i>Hyalella azteca</i>	8	GC	cr	5		6		9

Asellidae								
<i>Caecidotea sp.</i>	8	GC	cr	2				
Insecta								
Collembola								
Sminthuridae								1
Ephemeroptera								
Baetidae								
<i>Callibaetis floridanus</i>		GC		3		10	1	3
Caenidae								
<i>Caenis sp.</i>	3	GC	sw		4		1	
Odonata								
Calopterygidae								
<i>Calopteryx sp.</i>	4	PR						2
<i>Hetaerina sp.</i>	3	PR					1	
Coenagrionidae							1	
<i>Argia sp.</i>	5	PR		1	4	3		1
<i>Enallagma sp.</i>	9	PR		2	1	6	1	1
<i>Ischnura sp.</i>	9	PR	cb	2	1	4		1
Corduliidae								
<i>Epithea princeps</i>		PR	sp			2		
<i>Macromia sp.</i>	2	PR		1				
Libellulidae				1		1		
<i>Erythemis sp.</i>	2	PR		2				
<i>Libellula sp.</i>	9	PR						1
<i>Pachydiplax longipennis</i>		PR						3
Heteroptera								
Belostomatidae		PR		2				
Gerridae		PR						
<i>Aquarius</i>		PR	sw			1		
Nepidae								
<i>Ranatra sp.</i>		PR				3		
Megaloptera								
Corydalidae								
<i>Corydalus cornutus</i>	2	PR		3			1	
Trichoptera								
Hydropsychidae							4	4
<i>Hydropsyche sp.</i>	4	FC	cn	10	1	1	9	4
<i>Cheumatopsyche sp.</i>	3	FC	cn	57	87		79	20
Hydroptilidae								
<i>Hydroptila sp.</i>	3	SC	cn				6	2
<i>Neotrichia sp.</i>	4	SC					4	
Polycentropodidae								
<i>Neureclipsis sp.</i>	3	FC		1			1	

Coleoptera								
Dytiscidae		PR				1		
Elmidae								
<i>Stenelmis sp.</i>	5	SC	cn			1		
Gyrinidae								
<i>Dineutus sp.</i>	4	PR		2				8
Halipilidae								
<i>Peltodytes sp.</i>	7	SH	cb				1	1
Hydrophilidae								
<i>Berosus sp.</i>	7	PR		1			2	
Diptera								
Chaoboridae								
<i>Chaoborus punctipennis</i>						1		
Chironomidae	6	FC				1		
Chironominae								
Chironomini								
<i>Chironomus sp.</i>	8	GC	bu	1		1	59	
<i>Cryptochironomus sp.</i>	5	PR	sp			1	7	1
<i>Cryptotendipes sp.</i>	4	GC	bu			2		
<i>Dicrotendipes</i>								
<i>neomodestus</i>	5	FC		5		12	10	4
<i>Endochironomus sp.</i>	6	SH	cn			1		
<i>Glyptotendipes sp.</i>	6	FC	bu	3	82	1		2
<i>Parachironomus sp.</i>	4	PR	sp		1	1		
<i>Paracladopelma sp.</i>	7	GC					3	
<i>Phaenopsectra obediens</i>								
group		OM				2		
<i>Polypedilum flavum</i>				28	3		3	4
<i>Polypedilum halterale</i>								
group						1		
<i>Polypedilum illinoense</i>								
group	7			23	1	24	133	39
<i>Polypedilum sp.</i>		SH	cb		1			
<i>Tribelos fuscicorne</i>							7	1
<i>Tribelos jucundus</i>								1
Pseudochironomini								
<i>Pseudochironomus sp.</i>							59	
Tanytarsini								
<i>Cladotanytarsus sp.</i>	4	GC	cb	1		1		
<i>Paratanytarsus dissimilis</i>						2		
<i>Rheotanytarsus exiguus</i>								
gp.		FC			11			
<i>Tanytarsus sp.</i>	4	FC	cb	1	3	2	3	6
Orthoclaadiinae								

<i>Corynoneura sp.</i>	4	GC	sp	1			
<i>Cricotopus bicinctus</i>	7	OM		3		14	2
<i>Rheocricotopus robacki</i>	4			1			
<i>Thienemanniella xena</i>	4	GC					2
Tanypodinae							
<i>Ablabesmyia mallochi</i>	5	OM		6	10	3	4
<i>Ablabesmyia rhamphe</i> group				9	5		2
<i>Conchapelopia sp.</i>	4	PR		20	5	66	7
<i>Labrundinia sp.</i>	4	PR	sp		1		
<i>Procladius sp.</i>	7	PR	sp	4	8	7	8
<i>Telopelopia okoboji</i>	4			5			
Empididae						1	
<i>Hemerodromia sp.</i>			sp			3	
Muscidae	6	PR				1	
Simuliidae							
<i>Simulium sp.</i>	5	FC	cn		2		

Raw fish data collected 8-29-17 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Species	Common Name	AS 1	AS2	AS3	AS5	AS6	Family/Group	IBI Trophic Guild Assignment	IBI Sensitivity	Repro. Guild	Pioneer?	Schooling?
Ameiurus natalis	yellow bullhead		1				Ictaluridae	V	T	C		
Amia calva	bowfin			1			Amiidae	C		C		
Aphredoderus sayanus	pirate perch			1			Aphredoderidae	V		M		
Cyprinella whipplei	steelcolor shiner				11		Cyprinidae	V		M		TRUE
Gambusia affinis	mosquitofish				1	12	Poeciliidae	V		N		
Ictalurus punctatus	channel catfish			1			Ictaluridae	C	T	C		
Lepomis cyanellus	green sunfish	4	5	7	8		Sunfish	V	T	C	TRUE	
Lepomis gulosus	warmouth	2	4	1		1	Sunfish	C		C		
Lepomis macrochirus	bluegill	10	15	3		4	Sunfish	V		C		
Lepomis megalotis	long-eared sunfish	4		3		2	Sunfish	V	SI	C		
Lepisosteus osseus	longnose gar				1		Lepisosteidae	C	T	M		
Micropterus punctulatus	Kentucky bass	1		1	1	1	Centrarchidae	C		C		
Micropterus salmonoides	largemouth bass		4				Centrarchidae	C		C		
Percina sciera	dusky darter				1	1	Percidae	V	S	S		
Phenacobius mirabilis	suckermouth minnow	4			20		Cyprinidae	V		S		TRUE
Pimephales notatus	bluntnose minnow	5			7		Cyprinidae	D	T	C	TRUE	TRUE
# individuals		30	29	18	50	21						
# species		7	5	8	8	6						
% deformed		3.33%	3.45%	0.00%	0.00%	0.00%						
Total Individuals							77					

* exotic species

IBI Trophic Guild Assignment = Detritivore-D, Omnivore-O, Invertivore-V, Insectivore-I, Carnivore-C

IBI Sensitivity = Sensitive-S, Intolerant-I, Both Sensitive & Intolerant (SI), Tolerant-T

Reproductive Guild = Simple lithophil-S, Complex with parental care-C, Simple miscellaneous-M, Complex with no parental care-N

APPENDIX D.

DATA TABLES OF PREVIOUS SURVEY EFFORT (2011)-WATER CHEMISTRY,
MACROINVERTEBRATES, FISH

Appendix D Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Stream	Flow Regime	Bankfull Width (ft)	Mean Bankfull Depth (ft)	Slope	Channel Material	RBP Score	Rosgen Stream Type*
AS1	6	Per	45.1	2.7	0.03	Silt	126	F5/F6
AS2	5	Int	6.5	0.3	0.01	Gravel	47	C6
AS3	11	Per	63	2.6	0.02	Silt	126	F5/F6

*Rosgen 1996

Appendix D Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana as compared to Indiana NPDES discharge standards and Minimum Surface Water Quality standards.

Parameter	AS1	AS2	AS3	NPDES Discharge Limits	Surface Water Quality Standards
Temperature (°C)	17.5	17.5	18.9	≤32.2	≤32.2
Flow Rate (ft/second)	0.72	0.31	1.12	NA	NA
pH	8.3	8.8	8.4	6.0 - 9.0	6.0 - 9.0
Total Dissolved Solids (mg/L)	1588	863	1129	NA	<750
Total Acidity (mg/L as CaCO ₃)	<10	<10	<10	NA	NA
Total Alkalinity (mg/L as CaCO ₃)	380	330	280	NA	NA
Total Iron (mg/L)	0.79	0.1	0.47	<6.0	NA
Total Manganese (mg/L)	0.19	0.02	0.066	<4.0	NA
Total Suspended Solids (mg/L)	39	24	25	<70	NA

Appendix D Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Taxa	8	1	19	1	18	1
Number of Individuals	26	1	86	1	129	3
Number of EPT Taxa	1	1	1	1	3	1
% Orthocladiinae + Tanytarsini of Chironomidae	0.0%	5	0.0%	5	14.3%	5
% Non-insects Minus Crayfish	5.4%	5	19.8%	3	9.3%	5
Number of Diptera Taxa	1	1	6	1	3	1
% Intolerant	7.7%	1	11.6%	1	39.5%	5
% Tolerant	11.5%	5	14.0%	3	0.8%	5
% Predators	42.3%	5	59.3%	5	20.9%	3
% Shredders + Scrapers	15.4%	3	15.1%	3	31.0%	5
% Collector-Filterers	7.7%	5	11.6%	3	36.4%	1
% Sprawlers	0.0%	1	3.5%	3	0.0%	1
Total Scores	34		30		36	

*<36=impaired, >36=unimpaired.

Appendix D Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Species	13	5	7	1	18	5
Number of Minnow Species	2	3	1	1	5	3
Number of Sunfish Species	5	5	2	3	5	5
Number of Sucker Species	0	1	0	1	0	1
Number of Sensitive Species	0	5	0	1	1	1
% Tolerant	21%	5	50%	3	22%	5
% Omnivore	5%	5	2%	5	4%	5
% Insectivore	84%	5	98%	5	84%	5
% Pioneer	11%	5	NA		NA	
% Carnivore	NA		2%	1	13%	3
Total # Individuals	62	1	148	3	85	1
% Simple Lithophilic Individuals	2%	1	0%	1	1%	1
% Individuals with Deformities	2%	3	1%	5	0%	5
Total Scores		44		30		40
Qualitative Rating*		Fair		Poor		Fair

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish

Peabody

Peabody







United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

September 22, 2017

Ms. Lee Anne Devine
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

UNITED MINERALS COMPANY, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
U.S. Army Corps of Engineers Project No. LRL-2013-635-gjd
Conditional Permit Approval

Dear Ms. Devine:

Please accept this letter as formal documentation of our proposal to include a permit condition on the above referenced application. This proposal was provided in an email sent to Colonel Gant by Kemal Williamson on September 1, 2017. As you are aware, prior to our meeting August 31, 2017 in Louisville we reevaluated the mining plan and significantly reduced the wetland impacts by an additional 144 acres. This change has been made with the intent of being able to move the permit forward with a robust Environmental Assessment. Sound scientific and engineering analysis, as well as, numerous past mining examples have been provided that demonstrate significant negative impacts to the adjacent wetlands are not expected.

In addition to the significant reduction in impacts and supporting analysis, an additional 140 acres of wetlands on the north end of the mining reserve has been identified and proposed for a restricted "Conditional" approval. This will reduce the wetlands initially proposed for impacts to approximately 200 acres and provide 4-5 years of mining at a 1M tons/year rate. During that time, the Corps can closely monitor whether or not significant indirect impacts occur and our performance on reclamation and mitigation. If the indirect impacts are significant and/or we are not performing the mitigation as required then the permit "Condition" is not met. As a result, Peabody is not allowed to continue mining into the 140 acres of wetlands shown on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and we can continue mining the adjacent 140 acres. An appropriate Adaptive Management Plan can be established to monitor for indirect impacts.

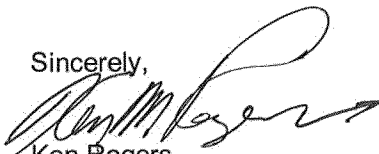
We believe the 'conditional approach' is very reasonable and should alleviate remaining concerns. Permit conditions are common practice in most all permits required for coal mining and are effective in addressing issues such as this.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
"Conditional" Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

If you have any questions or comments, I can be reached at **812.922.1044** or via email at **<Krogers@peabodyenergy.com>**. We look forward to continue working with you and others on this important project.

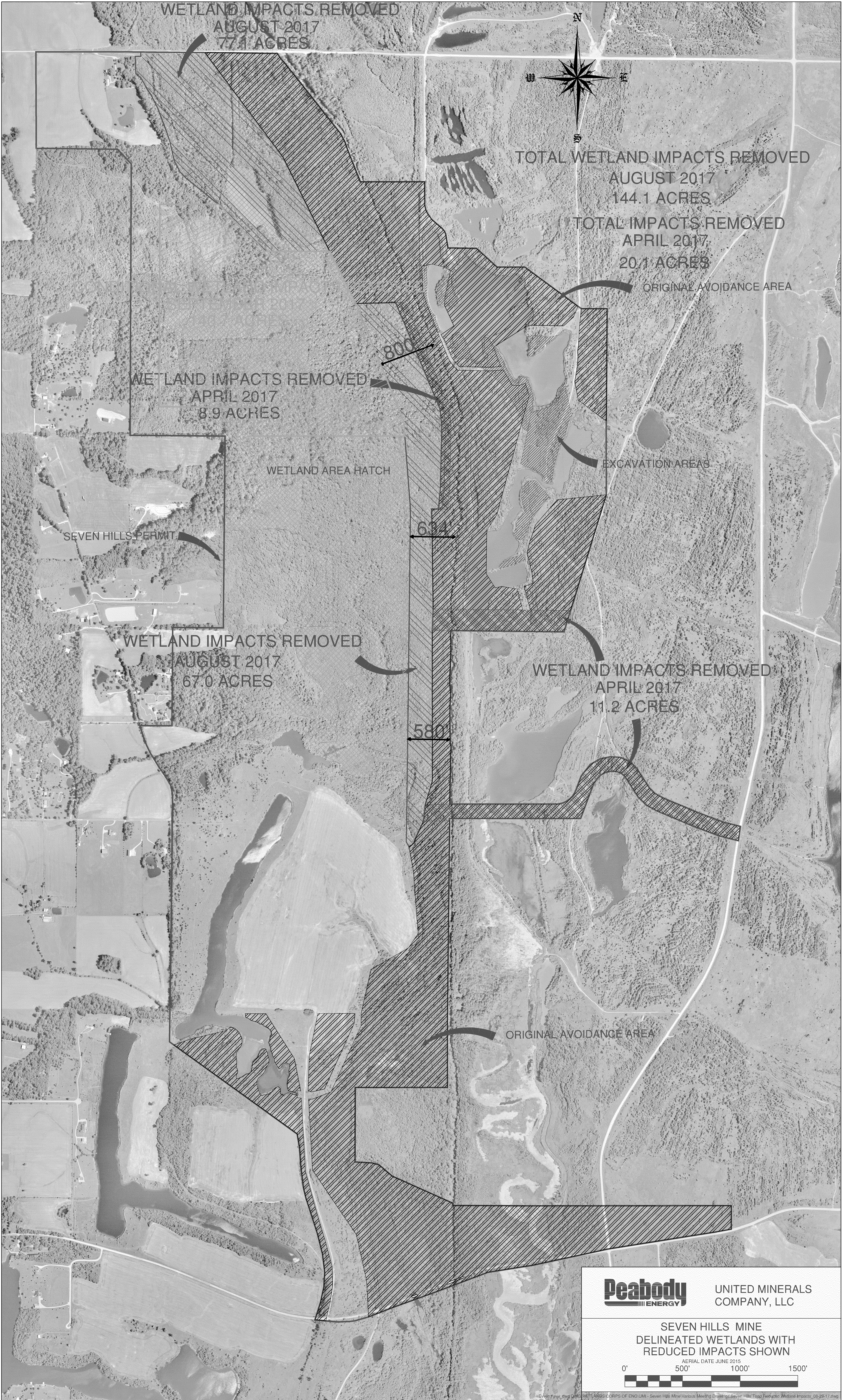
Sincerely,



Ken Rogers
Director Environmental Services
Authorized Representative

Enclosures

cc: Seven Hills Mine - Permit Binder (1x)



Seven Hills (ID No. LRL-2013-00635-gjd) Permit Application Modification Summary (Oct 18, 2017)

Avoidance and Minimization:

- In addition to the 510 acres already designated as avoidance, Peabody is modifying the mining plan to avoid impacting an additional 162 acres of wetlands and 9,445 linear feet of streams in the Seven Hills mining area. This change results in an additional 3 million tons of high quality coal that will not be mined. The resulting buffer between Pigeon Creek and the mining area is increased from a minimum of 110 feet to a minimum of 580 feet and is 800 feet wide in many areas. Peabody is also proposing to include 141 acres of wetlands in a “Conditional” area where approval to mine will not be granted unless Peabody is meeting its permit mitigation obligations and secondary impacts to adjacent wetlands are minimal, as expected. The initial mining area Peabody is seeking approval for includes 207 acres of wetlands and 33,778 linear feet of streams. The footprint and WOTUS impacts at Seven Hills are significantly less than those approved for impacts at Bear Run and Wild Boar. The stream and wetland impact reductions are shown in the table below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Mitigation and Proposed Enhancements:

Consistent with past permits where an ARNI and/or EIS have been requested, Peabody proposes the following mitigation plan to fully satisfy a Mitigated FONSI resolution for the Seven Hills permit. The HGM analysis requested by the Corps and EPA indicate an approximate 2:1 mitigation ratio fully mitigates site impacts. HGM analysis will be utilized on all mitigation sites to finalize values. Peabody believes the plan below produces 734 mitigation credits and an effective 3.5:1 mitigation ratio for the initial mining area. This is a 75% increase over what the HGM analysis shows is needed for mitigation and well exceeds the less than 2:1 average ratio proposed in the original submittal.

- 2.5:1 Wetland mitigation
 - 1:1 on site mitigation
 - 1:1 off-site mitigation in the Highland-Pigeon watershed.
 - 0.5:1 off-site mitigation in the Highland-Pigeon or adjacent watershed.
- High value “preferred” tree species will be utilized on all mitigation sites.
- Add diversity (roughness, pools, etc.) into the mitigation plan
- Lower elevations of previously reclaimed areas on the east side of Pigeon Creek to enhance floodplain effectiveness and create additional wetlands.
- Stabilize and repair drainages connecting the wetlands to Pigeon Creek to prevent further head-cutting into the wetlands.
- At the completion of mining, Peabody will undertake removal of the “levee” along the west side of Pigeon Creek to enhance the connectivity and overbank flooding into the wetlands.
- Add Copperbelly watersnake habitat enhancements in the reclamation/mitigation plans.
- Conduct upstream and downstream sampling for Nutrients pre, post and during mining.
- Place a Conservation Easement on a 20 acre forested wetland tract containing an Indiana Bat roost tree in a survey from 2008. This is located approximately 3 miles south of the mining area.
- Provide a Conservation Easement on the avoided wetlands (219 acres) that provide the buffer between the mining area and Pigeon Creek.
- All intermittent streams will be mitigated at a 1:1 ratio utilizing natural stream restoration techniques.



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October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

RE: Modification to Pending Permit Application No. LRL-2013-635-gjd

Dear Colonel Gant:

Previously, we proposed a revised mine plan which significantly reduces wetland impacts at the proposed Seven Hills mine site. This plan includes removing 162 acres of wetlands and 9,445 linear feet from the planned impact area and only requesting "Conditional" approval for future impacts to 140 acres of wetlands and 10,617 linear feet of ephemeral and intermittent streams. Our proposal is for approval to conduct mining operations in the initial area. This will allow Peabody, the Corps and the Indiana Department of Natural Resources (INDNR) to monitor the on-site and off-site mitigation efforts and whether or not significant secondary impacts to the adjacent wetlands are occurring. As you are aware, Peabody has provided engineering and environmental analysis and numerous past mining examples that indicate adjacent negative impacts are not expected; however, if the indirect impacts are significant and/or the mitigation is not being completed as the permit requires the permit "Condition" is not met. As a result, Peabody would not be allowed to continue mining into the 140 acres of wetlands depicted on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and mining is allowed to continue through the "Conditional" 140 acre wetland area. Peabody will also work with the Corps to develop an effective Adaptive Management Plan (AMP) to outline monitoring and any needed corrective actions.

This modification directly responds to concerns raised by the Corps, USEPA and the U.S. Fish and Wildlife Service including:

- Increasing the undisturbed buffer along the west side of Pigeon Creek. The original plan included a minimum buffer width of approximately 110 feet, which is a typical setback distance from a perennial stream. The minimum buffer width will now be 580 feet. While Pigeon Creek is a straightened, dredged and actively eroding channel, the nearly fivefold increase in buffer width will provide additional protection between the mining area and stream and significant travel and habitat areas for potential wildlife and aquatic species including the Indiana Bat and Copperbelly Water snake. Along with the approved Protection and Enhancement Plans (PEPs) included in the approved Surface Mining

Control and Reclamation Act (SMCRA) permit , this plan modification will provide even greater protections to any species of concern.

- The overall footprint of the mining operation has been decreased. It was mentioned in a meeting with the Louisville District that the project needed to be reduced to a “couple hundred acres” of wetland impacts. It is unclear what this direction is based upon, but it does make the initial wetland impact acreage similar to wet land impacts approved through Environmental Assessments and mitigated FONSIs at Bear Run (235 acres of wetland impacts) and Wild Boar (145 acres of wetland impacts). This modification achieves the balance of minimizing the impact while allowing production of an important and valuable energy resource. Unfortunately, the reduced impact area results in an additional 3 million tons of high quality coal remaining in the ground . Nevertheless, a safe and efficient mine can still occur, albeit at a reduced annual production rate.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Wetland Quality

Given you only recently assumed command over the Louisville District, the following summary of the wetland characteristics of the planned impact site are provided to refute incorrect claims of the wetlands being special and unique.

- There are no special or unique trees. In fact, the tree species are typical of southwestern Indiana forested wetlands, according to a review by a professional forester. Logging has occurred on multiple occasions. Please note many of the tree species present on the site are not allowed to be planted for mitigation purposes in the Louisville District, due to the less desirable non-hardwood species.
- Nearly 80% of the wetlands planned for impacts were previously farmed with conventional agricultural methods. The wetlands developed by simply ceasing to farm over time, likely due to increasing beaver activity.

- There is infrequent overbank flooding (3 -7 days per year on average) into the wetlands from Pigeon Creek. In addition, the channel connections from the wetlands into Pigeon Creek are actively eroding and head cutting further into the wetlands.
- The modified plan results in impacts to only 2.1% of the wetlands in the Highland – Pigeon Watershed. The Seven Hills wetlands are not a significant portion of the wetlands in the watershed and the wetland acreages will increase with the additional mitigation proposed in this plan.
- Pigeon Creek is a straightened, eroding, low quality stream. Aquatic life sampling indicates values are rated “fair”. This is similar to what is found in agricultural areas in southern Indiana
- The Hydrogeomorphic (HGM) analysis shows the wetlands can be fully mitigated with an approximate 2:1 mitigation ratio. HGM does not indicate the Seven Hills wetlands are special or unique, it is only a relative measure compared to wetlands in western Kentucky that were used as a reference. Again, these wetlands mostly developed by ceasing farming activities. If a special and unique wetland is present in the area, the Patoka River wetlands located approximately 15 miles north of Seven Hills may be an example. This multi-thousand acre wetland complex is diverse and much more valuable than the Seven Hills wetlands.

Mitigation

Peabody is proposing on-site mitigation/minimization at a ratio of 1:1, off-site mitigation at a ratio of 1.5:1 and many additional enhancements which are quantified in the table below. The Greathouse Island property located adjacent to the Wabash River was previously proposed for mitigation; however, the surprisingly low credit values the Corps was willing to grant for this property caused Peabody to drop the option it had to purchase this property. The option was held for 5 years and nearly \$400,000 was invested on what was and is still believed to be a very high potential mitigation property. We have recently requested guidance on mitigation credits for properties within the Highland -Pigeon watershed and in adjacent watersheds, yet the Louisville District has not provided any clear guidance on the potential mitigation value for these properties. The acquisition of such properties is time consuming and there are other entities competing to acquire these properties. The inability to gain a clear understanding of the mitigation value that the Corps will grant puts Peabody in a competitive disadvantage and leads to missed opportunities and wasted time and resources. This is especially frustrating and confusing, when the Louisville District suggested earlier this year, that we contact the Patoka National Wildlife Refuge manager about potential mitigation properties in the Refuge target area that would be desirable mitigation properties for Seven Hills. Further, site visits were made with Louisville District personnel and favorable verbal opinions were given on the value of one property that Peabody has the potential to

acquire. Peabody renews its request to obtain clear guidance on potential mitigation values of properties that it brings forward, so it has a fair opportunity to obtain these properties and not waste valuable time and resources similar to the Greathouse Island example.

Considering the reluctance to engage on specific mitigation, Peabody is proposing the following conceptual mitigation plan. This plan can be finalized with site specific data following agreement on the requirement and appropriate feedback on mitigation values of proposed properties.

- Peabody will provide a 2.5:1 wetland mitigation ratio consisting of 1:1 acres on-site and 1.5:1 acres off-site. The HGM process which the Corps and EPA requested Peabody to use in the spring of this year, indicates an approximate 2:1 mitigation ratio fully mitigates the planned site impacts. This is consistent with the HGM assessment completed at this site initially in 2007. The HGM process has not been utilized previously for other Peabody permits in the Louisville District and it appears to provide a much better and transparent method of calculating wetland mitigation needs than the ambiguous methods employed in the past.
 - Regarding the off-site mitigation, Peabody commits to providing 1:1 acreage in the Highland – Pigeon watershed. At a minimum, this will fully mitigate the site impacts in the same watershed. When other mitigation enhancements are considered as described below, the actual mitigation ratio is increased further. It is important to note the off-site mitigation will not only create additional wetlands, but it will also reduce conventional agriculture activities as this acreage will consist of converting current croplands to wetlands.
 - Peabody will provide approximately 0.5:1 mitigation in the Highland – Pigeon or adjacent watersheds. Please note the adjacent watersheds in southwest Indiana are very similar in watershed impacts and needed improvements as there is a prevalence of conventional agricultural activities occurring in the region.
 - Peabody will complete the mitigation as a mix of forested, scrub/shrub and emergent wetlands in a manner representative of the impact site or complete all of the mitigation as a forested wetland. Forested wetlands have been considered to be of higher value by the Louisville District to date.
 - Peabody will utilize high value hardwood tree species on both the on-site and off-site mitigation areas. Please note the Louisville District has not allowed Peabody to plant many of the existing tree species currently present at the site.
 - Peabody will add intentional diversity (pools, roughness, etc.) into the topography to enhance the site.

- Peabody will lower elevations of previously reclaimed areas on the east side of Pigeon Creek to create additional wetlands that will receive more overbank flow from Pigeon Creek and provide additional flood storage and flood water treatment. This issue was deemed very important to the US Fish and Wildlife Service and also serves to create additional habitat for many local species. Please note this work will be completed in advance of mining operations as part of the work is also needed for the flood control purposes during mining. This area will remain in its current state and the floodplain will not be expanded if the mining project is not allowed.
- Peabody will repair existing drainages and install appropriate stabilizing and habitat enhancing structures in the avoidance areas between the mining area and Pigeon Creek. These drainages are currently actively eroding and head cutting through the wetlands. If this project does not move forward, these drainages will continue eroding and will degrade the wetlands over time. Peabody will also restore impacted intermittent drainages at a 1:1 mitigation ratio with appropriate natural stream construction enhancements.
- At the completion of mining, Peabody will remove the “levee” along the west side of Pigeon Creek in strategic locations to improve the connectivity and over bank flooding of the creek into the wetlands. If the mining project does not occur, this improvement will not occur.
- Peabody will incorporate Copperbelly watersnake (CWS) habitat into its mitigation plan along Pigeon Creek to address U.S. Fish and Wildlife Service concerns. These efforts have proven to be successful at previous mining locations, including the Columbia Mine which has been added to the Patoka National Wildlife Refuge. Also, please note one of the recent potential mitigation properties submitted to the Corps for a mitigation value determination is in the Patoka River watershed and within the Refuge target acquisition area and is considered Core Habitat for the CWS. The Refuge has been unable to acquire this property; however, the property could be acquired and used as mitigation for this property, if the mitigation values were known and valued correctly.
- Peabody will conduct upstream and downstream sampling for Nutrients before, during and after mining. No impacts are expected regarding Nutrients; however, the sampling can confirm this and will address a concern from U.S. EPA.
- Peabody will place a Conservation Easement on a 20 acre forested wetland in the Pigeon Creek watershed, located approximately 3 miles south of the mining area. An Indiana Bat roost tree was identified on this tract in a 2008 Indiana Bat survey and the tract contains numerous trees with sloughing bark which is ideal roost tree habitat. This tract is currently not included in a permit and not subject to the Protection and Enhancement Plans (PEPs); therefore, timber cutting could occur at any time. Peabody intentionally acquired this

property for this purpose and will likely sell it, if appropriate credit is not given. This area will be protected in perpetuity if the mining project occurs.

- As mentioned previously, a minimum buffer width of 580 feet will be in place between the mining area and Pigeon Creek. The buffer is up to 800 feet wide in some stretches. This area will be protected with a conservation easement that will prevent future timber cutting. This protection will not be in place if the mining project is not approved.
- Peabody owns additional properties in the Pigeon Creek corridor which it is willing to consider site protection instruments on if appropriate mitigation credit is provided.

Given the direct mitigation acreage and enhancements listed above, Peabody believes the wetland mitigation value for the initial 207 acres of wetland impacts is outlined in the table below.

Mitigation Activity	Acreage	Mitigation Credit Factor	Total Credit
On-site mitigation	207	1	207
On-site Protection	207	0.2	41
Off-site mitigation	311	1	311
Off-site Protection	311	0.15	47
Removal of active cropland by conversion to wetlands	311	0.1	31
Preferred hardwood tree species	518	0.05	26
Stabilize and repair drainages, remove levee and add CWS habitat in avoidance/buffer area	219	0.1	22
Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

This project is very important to Peabody's Midwest operations and workforce and we are hopeful that any remaining issues can be resolved promptly. Upon agreement of the plan modification, Peabody will move forward to revise all applicable parts of the application. If you have any questions or comments, I can be reached by email at Bwest@peabodyenergy.com or at 812-455-278.

Sincerely,

Bryce West
Vice President Environmental Services

Enclosures

**AQUATIC ASSESSMENT REPORT
PROPOSED SEVEN HILLS SURFACE MINE
WARRICK COUNTY, IN**



Prepared for:

**Peabody Energy
Lynnville, Indiana**

Prepared by:

**Eco-Tech Consultants, Inc.
Louisville, KY**

September 2017





AQUATIC ASSESSMENT REPORT

PROPOSED SEVEN HILLS SURFACE MINE

WARRICK COUNTY, IN

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FIGURES

FIGURE 1 **Project Location Map**

APPENDICES

APPENDIX A	Representative Photographs
APPENDIX B	EPA RBP forms and supplemental stream habitat forms
APPENDIX C	Raw data (2017)-water chemistry, macroinvertebrates, fish
APPENDIX D	Data tables of previous survey effort (2011) - water chemistry, macroinvertebrates, fish

1. INTRODUCTION

Eco-Tech Consultants, Inc. (Eco-Tech) was contracted by Peabody Energy of Lynnville, Indiana to assess current aquatic conditions at a proposed surface mine in Warrick County, Indiana. The proposed site is within the Seven Hills Permit Area. Eco-Tech has previously performed an aquatic assessment at this location in 2011, along with several other ecological studies.

2. STUDY AREA

The project area is within the Southern Wabash Lowlands (U.S. Environmental Protection Agency [U.S. EPA] Level IV ecoregion). This area is characterized by an undulating landscape consisting of many wide, shallow valleys. Soils are neutral to acid ic, and originally the area was covered with oak-hickory forests on upland sites and mesophytic forests on lowland sites. Row crop agriculture and surface mining are prevalent land uses within the landscape surrounding the project area (Woods et al. 1998).

The site is bound on the north by Seven Hills Road (County Road 750 N) and to the south by Boonville-New Harmony Road (County Road 400 N) on the Daylight, Boonville, and Elberfeld, Indiana USGS Topographic Quadrangles. The permit area lies mostly within the western floodplain of Pigeon Creek. Various roads and trails occur throughout the project area (Figures 1). The total acreage of the site is 1,680 acres and is predominantly forest with some cropped areas and former mine impoundments.

Pigeon Creek is a fourth order tributary to the Ohio River. The stream's watershed drains approximately 225 square miles near the southern terminus of the project area (USGS, 2012). Pigeon Creek has been extensively channelized, and remnants of the original course exist as scrolling wetlands and oxbows visible on aerial imagery (Figure 1). The aquatic study area is within the Highland-Pigeon Creek drainage basin (HUC 05140202).

3. METHODS

Potential sample locations were identified using GIS data and knowledge of the site collected during previous studies, and three of the sites (AS1, AS2, and AS3) were previously sampled by Eco-Tech (2011b). Six potential sample locations with intermittent or perennial flow regimes were assessed to determine if suitable habitat was present to maintain aquatic assemblages that could be adequately sampled. Five of the proposed six sites contained flowing water at the time of sampling and were included in the survey: one site on an intermittent tributary stream and four sites on the mainstem of Pigeon Creek (one upstream of the proposed mine, one at the upper end of proposed mine, and two below the proposed mine area) (Figure 1). Proposed aquatic site 4 (AS4) did not have adequate stream flow to sample (Appendix A).

Eco-Tech collected information on stream habitat characteristics, water chemistry, and fish and benthic macroinvertebrate communities on August 28 -29, 2017 . Data collection was completed using the most current Indiana Department of Environmental Management (IDEM) standard operating procedures obtained from IDEM staff Ali Meils and Stacey Sobat (pers. comm., 8/23/2017).

3.1. Stream Habitat Description

Sample points were photographed and assessed according to the U.S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocol (RBP) for low -gradient streams and IDEM *Procedures for Completing the Qualitative Habitat Evaluation Index (QHEI) B-003-OWQ-WAP-XX-16-T-R0 Technical Standard Operating Procedure (2016)* by Eco-Tech staff. Drainage areas were delineated using the US Geological Survey web interface program StreamStats (v4.1.2; USGS 2012).

3.2. Water Quality Sampling

Water temperature, dissolved oxygen, and total dissolved solids were measured in the field with a handheld YSI 85 system (YSI Incorporated), and pH was measured with a pHTestr 1 (Oakton). Eco-Tech collected water samples for measurement of additional parameters and delivered them to Rosedale Services, Inc. in Boonville, Indiana. Levels of total iron, total manganese, acidity, alkalinity, and total dissolved solids were determined.

3.3. Macroinvertebrate Community Assessment

IDEM Aquatic macroinvertebrate sampling followed the protocol as defined in *Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0 Technical Standard Operating Procedure (2014)*.

Sweep samples were used to collect macroinvertebrates at each aquatic sample point . During the sweep sample, best professional judgment and experience were used to sample as many microhabitats (rootwads, emergent vegetation, woody debris, leaf packs, sandy and silty substrates, and cobble and gravel substrates) as possible, sampling these microhabitats in 1.5-2 meter intervals along 50 meters of shoreline habitat. Due to the fact that the streams are low gradient, and no substantial riffles were present at the proposed sample points, riffle kick samples were modified for short riffles, runs, and glides according to MHAB procedures.

Samples were elutriated, and placed into a white sorting tray. Samples were picked for 15 minutes, and the resulting subsample of invertebrates was preserved in 70 percent ethanol. Invertebrates were identified by Pennington and Associates, Inc. (Cookeville, TN) to “lowest practical taxon” as per IDEM guidance.

Taxa numbers were tabulated to calculate metrics used to produce the Indiana macroinvertebrate Index of Biotic Integrity (mIBI). The metrics were calculated using tolerance values, feeding groups, and habit behavior classifications provided by IDEM in their “Indiana Macroinvertebrate Taxa Attributes” document. Values were then assigned to a ranking system and summed to produce the mIBI according to instructions provided by IDEM in their “Calculating IDEM Macroinvertebrate Index of Biotic Integrity (mIBI)” document (provided by Ali Meils, IDEM Senior Environmental Manager).

3.4. Fish Community Assessment

Fish communities were sampled using a backpack electrofisher (Halltech Aquatic Research Inc. HT2000B/MK5) according to protocols designed by IDEM’s Surface Water Quality Assessment Program (provided by Stacey Sobat, IDEM Section Chief for the Probabilistic Monitoring Program). A length of stream equal to 1.5 times the stream width was sampled, ensuring equal and representative coverage of both banks. At least one individual per species, per site was preserved as a voucher specimen, as well as any unidentified specimens. All individuals were identified and enumerated by an Eco-Tech biologist familiar with low gradient stream fauna of southwest Indiana.

Taxa numbers were tabulated to calculate metrics used to produce an Index of Biotic Integrity (IBI). The metrics were calculated using sensitivity categories, trophic guilds, reproductive guilds, and additional classifications provided by IDEM in their document entitled “Appendix with Taxa Characteristics for IBI Calculations.” Values were then assigned to a ranking system and summed to produce the IBI according to instructions provided by IDEM in their document entitled “Interior River Lowland Calibration Summary” (provided by Stacey Sobat, IDEM Manager Section Chief for the Probabilistic Monitoring Program). Qualitative descriptors for IBI scores were provided by IDEM.

It should be noted that high levels of total dissolved solids were observed which can be problematic with electroshocking (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995). Typical voltage levels had to be reduced in order to prevent electrical overloading of the backpack unit. In order to offset this, additional time and surveyed area was added to the effort at each location. Fish seining was largely impossible due to the high accumulation of coarse woody debris anchored in the fine sediment.

4. RESULTS

4.1. Stream Habitat Description

Stream channels at all five sample sites have been altered by human activities. Pigeon Creek (sites AS1, AS3, AS5, and AS6) has been extensively channelized, and site AS2 is on a channel that appears to be a man-made conveyance built to drain a final cut impoundment from previous surface mining activities. EPA RBP habitat assessment and IDEM Qualitative Habitat Evaluation Index (QHEI) forms are provided in Appendix B. Stream characteristics are summarized in Table 1.

Sites on Pigeon Creek (AS1, AS3, AS5, and AS6) received lower RBP and QHEI scores than AS2 due to a lack of canopy cover, homogeneous fine substrate, and little development of diverse aquatic habitats. Sites AS5 and AS6 received higher QHEI scores than AS1 and AS3 primarily because of greater bank stability and habitat heterogeneity. Channel substrate at all sites is primarily silt/soil; however, a few isolated gravel deposits and areas of exposed hardpan comprised of clay and gravel were noted. Within the sections of Pigeon Creek surveyed, fine sediment bars were observed forming in the center of the stream channel. Sites AS1 and AS3 received scoring indicating impaired waterways. Photos of sample locations are provided in Appendix A.

Previous stream habitat analysis noted that stream AS1, AS2, and AS3 received EPA RBP scores of 126, 47, and 126, respectively. The scoring from previous years is similar to the current survey (Appendix D). Site AS2 did receive higher RBP scoring likely due to beaver impact having a stabilizing effect on flow regime and the progressive growth of woody vegetation within the riparian habitat in the years between survey years.

Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Flow Regime	Dominant Channel Material	IDEM QHEI Score	EPA RBP Score
AS1	Perennial	Silt	46	112
AS2	Intermittent	Gravel	45	88
AS3	Perennial	Silt	48	102
AS5	Perennial	Gravel	53	96
AS6	Perennial	Silt	52	107

4.2. Water Quality Results

Physical and chemical parameters measured at the five aquatic sample sites are provided in Table 2. These measurements will provide monitoring data, which can be compared to previous conditions. Water quality standards for aquatic life in Ohio and Illinois River from Indiana's Administrative Code, Minimum Surface Water Quality Standards (327 IAC 2 -1-6), have a dissolved oxygen (DO) lower standard of 4.0 mg/L. All sample sites from this survey were at or below this standard, indicating a strong organic component in the system and lack of habitat and gradient to adequately oxygenate the water column.

Total dissolved solids (TDS) at all five sites are elevated. While IDEM does not have an aquatic life standard for TDS, elevated water salinity, as measured by specific conductivity and a dominant component of TDS, has been shown to negatively affect aquatic life in freshwaters (U.S. EPA 2016). This parameter may reflect anthropogenic land use influences in the watershed and may also be driven by a strong groundwater hydrologic influence. Although the survey data of TDS and DO indicate water quality may be at levels to cause stress to aquatic organisms, it was not determined if these results are from naturally occurring sources or from

anthropogenic effects. All other parameters were within typical water quality standards for unimpaired waterways.

Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1	AS2	AS3	AS5	AS6
Temperature (°C)	22.7	25.8	22.9	22.5	23.2
Dissolve Oxygen (DO)	4.00	3.80	3.90	3.87	4.05
pH	8.1	8.2	8	7.9	8.2
Total Dissolved Solids (mg/L)	1440	1100	2110	2230	2070
Total Acidity (mg/L as CaCo3)	<10	<10	<10	<10	<10
Total Alkalinity (mg/L as CaCo3)	313	280	256	344	255
Total Iron (mg/L)	0.16	<0.1	<0.1	<0.1	0.18
Total Manganese (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1
Total Suspended Solids (mg/L)	<10	<10	11.7	<10	23

Previous physical and chemical parameter by Eco-Tech (2011b) noted that total dissolved solids at sites AS1, AS2, and AS3 were noted to be high at the time of sampling. All other parameters fell within the water quality parameters of the time (Appendix D).

4.3. Macroinvertebrate Sampling Results

Previous macroinvertebrate sampling at AS1, AS2, and AS3 yielded a total of 241 individuals of 32 taxa. The most common taxa sampled at all three sites included clam shrimp (Spinicaudata), narrow-winged damselflies (*Enallagma* spp.), net-spinning caddisflies (*Cheumatopsyche* spp.), and riffle beetles (*Stenelmis* spp.) (Appendix D).

Macroinvertebrate from 2017 sampling effort yielded a total of 1,196 individuals of 77 taxa. Macroinvertebrate IBI scores ranged from 34 to 38, and IDEM considers streams scoring less than 36 to be impaired. All sites exhibited some level of stress to the faunal community making them borderline impaired reaches.

Higher metric scoring for individual sites in general resulted from low percentages of Orthocladiinae and Tanytarsini of Chironomidae, non-insects minus crayfish, and tolerant taxa. The low scores obtained for individual sites in general are the result of several indicators of poor stream health, including the number of EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa, percent shredders and scrapers, and percent collector filterers. The highest score was observed at AS3, and this is due to the fact that the greatest number of individuals and greatest percentage of intolerant taxa were collected there.

While more individuals and taxa were collected in 2017 than in 2011, the taxa observed did not exhibit a high quality macroinvertebrate community. Significant results common among all five sites included narrow-winged damselflies (*Enallagma* sp.), net-spinning caddisflies (*Hydropsyche* sp.), and various midge species (*Polypedilum illinoense* group and *Tanytarsus* sp.).

Taxa that occurred at four of the five sites include d small minnow mayflies (*Callibaetis floridanus*), dancer damselflies (*Argia* sp.), forktail damselflies (*Ischnura* sp.), net-spinning caddisflies (*Cheumatopsyche* sp.), and various midge species (*Dicrotendipes neomodestus* , *Glyptotendipes* sp., *Polypedilum flavum* , *Ablabesmyia mallochi*, *Conchapelopia* sp., and *Procladius* sp.) The most abundant species found at all five sites was *Polypedilum illinoense* group (n=220), and the most abundant species from the entire survey effort was *Cheumatopsyche* sp. (n=243; Appendix C). Some of the taxa (midges and damselflies) are commonly found in lentic habitats (pools) in vegetation, mud, debris, or rootwads, which are common in Pigeon Creek. The small minnow mayflies and net-spinning caddisflies, are often found in areas with more flowing water. Taxa richness was greatest at AS1, AS3, and AS5 most likely to greater habitat heterogeneity between riffle, pool, woody debris, root wad, and leaf pack habitat.

Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Taxa	34	3	20	1	34	3	32	3	30	3
Number of Individuals	216	3	212	3	123	1	495	5	150	3
Number of EPT Taxa	4	1	3	3	2	1	8	3	5	1
% Orthocladiinae + Tanytarsini of Chironomidae	3.2%	5	6.6%	5	4.1%	5	3.4%	5	6.7%	5
% Non-insects Minus Crayfish	7.9%	5	4.7%	5	5.7%	5	1.0%	5	10.0%	5
Number of Diptera Taxa	15	5	8	3	20	5	16	5	14	5
% Intolerant	29.6%	3	42.9%	5	0.0%	1	18.0%	3	14.7%	1
% Tolerant	6.5%	5	3.8%	5	14.6%	3	12.7%	3	8.0%	5
% Predators	18.5%	3	3.3%	1	29.3%	3	17.4%	1	22.0%	3
% Shredders + Scrapers	0.5%	1	0.5%	1	2.4%	1	2.2%	1	2.0%	1
% Collector-Filterers	39.4%	1	87.7%	1	13.8%	3	20.6%	1	28.0%	1
% Sprawlers	2.3%	1	0.5%	1	10.6%	5	3.4%	3	6.0%	5
Total Scores	36		34		36		38		38	

*<36=impaired, ≥36=unimpaired.

4.4. Fish Sampling Results

Previous sampling on Pigeon Creek (Eco-Tech, 2011b) indicated qualitative ratings of fair (AS1 and AS3) and poor (AS2), yielding a total of 295 individuals and 25 taxa. Channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) were found at all three sites. Other relatively populous species (>10 individuals) included black bullheads (*Ameiurus melas*), steelcolor shiners (*Cyprinella whipplei*), blackstripe topminnows (*Fundulus notatus*), and golden shiners (*Notemigonus chrysoleucus*), and two species known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in the 2011 survey is listed as

threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana (Eco-Tech 2011b; Appendix D).

In 2017, sampling yielded 17 fish species. IBI scores ranged from 17 to 24. Fish communities at four sample sites were classified as indicative of poor stream habitat and one site's community was classified as very poor (58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish). The low scores obtained at all five sites were caused by low overall species richness, low minnow species richness, no occurrences of sucker species or sensitive species, and low percentages of carnivorous or pioneer fish and simple lithophiles (fish that lay eggs on rocks). IBI scores for 2017 are lower than the previous survey (Appendix D). Lower fish diversity and number captured individuals could possibly be explained by higher water temperatures, which also increased the ambient conductivity (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995), and so fish bio-regulatory processes and behavior were adversely affected for electroshock sampling. The same backpack shocker and operator were used for both surveys. Fish seining to offset the reduction of captured fish was prevented by coarse woody debris distributed throughout the sites on Pigeon Creek.

Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Species	7	1	5	5	8	1	8	1	6	1
Number of Minnow Species	2	1	0	0	0	0	3	0	0	0
Number of Sunfish Species	4	1	3	3	4	1	1	1	3	1
Number of Sucker Species	0	0	0	0	0	0	0	0	0	0
Number of Sensitive Species	1	1	0	0	1	1	1	1	2	1
% Tolerant	30%	3	21%	5	39%	3	32%	3	0%	5
% Omnivore	17%	3	0%	0	0%	5	0%	5	0%	5
% Insectivore	0%	0	0%	0	0%	0	0%	0	0%	0
% Pioneer	N/A		17%	5	N/A		N/A		N/A	
% Carnivore	10%	1	N/A	0	17%	1	4%	1	10%	1
Total # Individuals	30	1	29	1	18	1	50	1	21	1
% Simple Lithophilic Individuals	0%	0	0%	0	0%	0	0%	0	0%	0
% Individuals with Deformities	0%	5	0%	5	0%	5	0%	5	0%	5
Totals		17		24		18		18		20
Qualitative Rating		Very Poor		Poor		Very Poor		Very Poor		Very Poor

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish

Green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and spotted bass (*Micropterus punctulatus*) were found at all three sites. These are habitat generalists, and green sunfish are especially tolerant of adverse habitat conditions, such as sedimentation and low oxygen. Relatively populous species (>8 total individuals) included steelcolor shiners (*Cyprinella whipplei*), mosquitofish (*Gambusia affinis*), warmouth (*Lepomis gulosus*), long-eared sunfish (*Lepomis megalotis*), suckermouth minnow (*Phenacobius mirabilis*), and bluntnose minnow (*Pimephales notatus*). These species are typical inhabitants of pools and vegetation beds of small to medium-sized tributaries of the Ohio River. To a certain degree, they are able to tolerate habitat conditions found in Midwestern low-gradient streams, including warm water temperatures, relatively low oxygen, sedimentation, and non-point source pollution. Only two species which are known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in this survey is listed as threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana.

5. SUMMARY

Streams within the project area display several indicators of disturbance and poor water quality. They have been subject to channelization and show very little development of instream habitat and stable substrate. Water quality measurements show significant stressors to aquatic life in the form of high dissolved solids and low dissolved oxygen. Fish and macroinvertebrate communities at all sites reflect a very tolerant aquatic assemblage that is adapted to low gradient streams with inadequate habitat and water quality issues.

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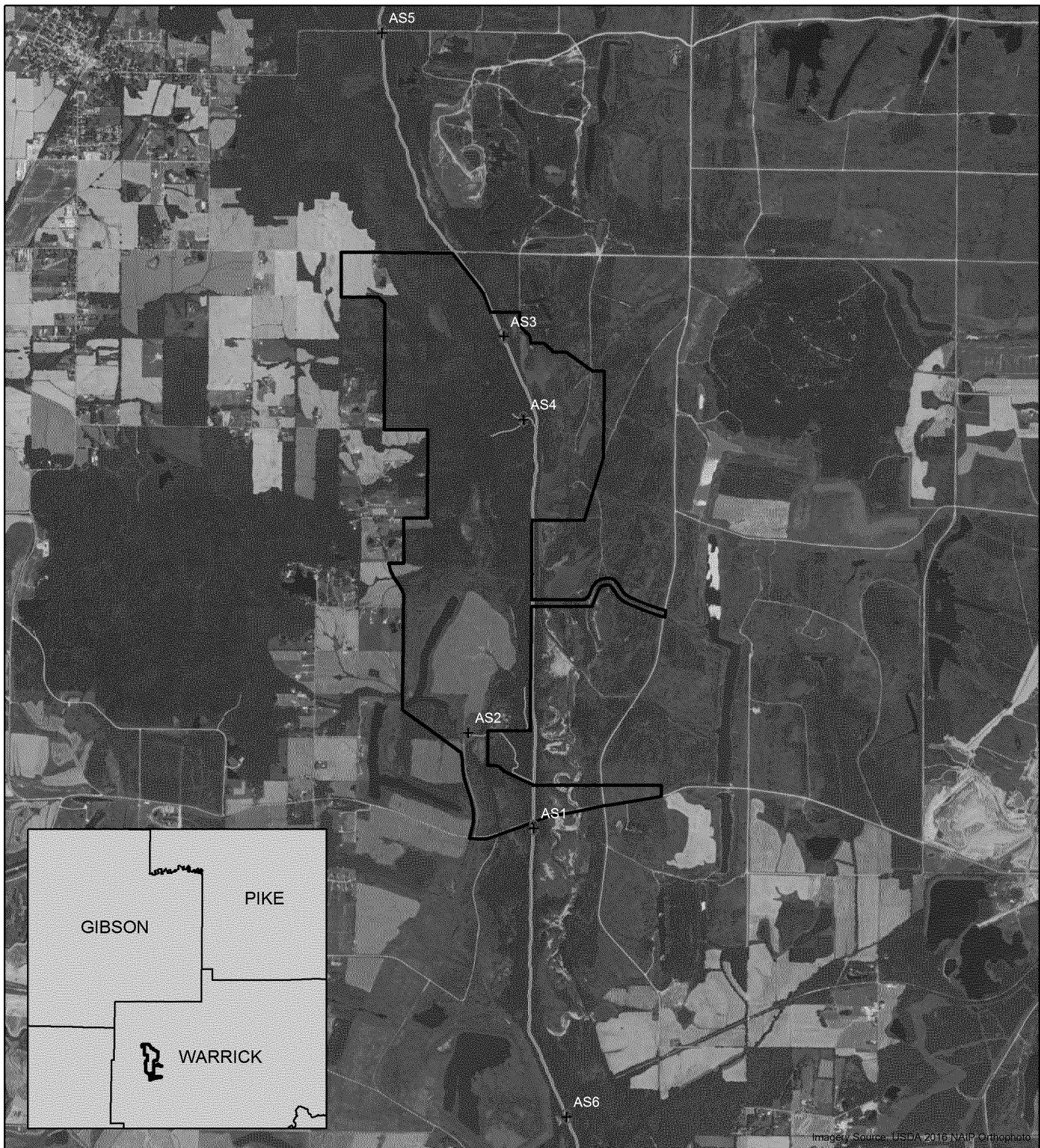
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FIGURES.

FIGURE 1: PROJECT LOCATION MAP



Legend

-  2017 Aquatic Sample Point
-  2017 Permit Boundary
-  Pigeon Creek


0 0.5 1
 Miles

Figure 1:

Aquatic Sample Points

Peabody Seven Hills Mine
 Warrick County, IN



Drawn by: RRN

Print Date: 9/15/2017

Project: LV2017025

APPENDIX A.

REPRESENTATIVE PHOTOGRAPHS



Photo 1. Sample point AS1 downstream view from bridge intersection



Photo 2. Sample point AS1 upstream view from bridge intersection



Photo 3. Sample point AS2 downstream view of pool habitat.



Photo 4. Sample point AS2 downstream view.



Photo 5. Sample point AS3 downstream view.



Photo 6. Sample point AS3 downstream view.

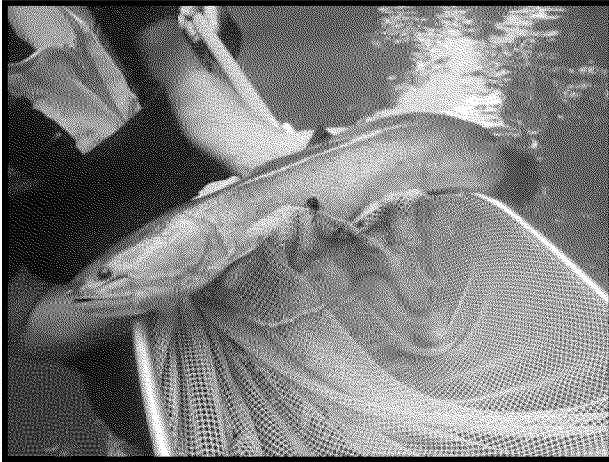


Photo 7. Bowfin (*Amia calva*) caught at AS3.



Photo 8. Sample point AS4 on survey date upstream view. Dry stream bed.



Photo 9. Sample point AS5 downstream view from underneath bridge.

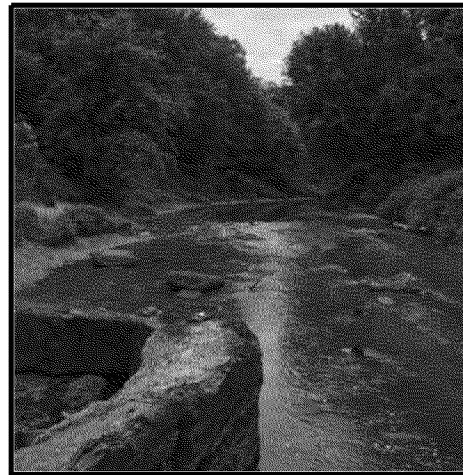


Photo 10 Sample point AS5 upstream view from underneath bridge. Showing clay hardpan.



Photo 11. Sample point AS6 downstream view.



Photo 12. Sample point AS6 upstream view.

APPENDIX B.

EPA RBP FORMS AND SUPPLEMENTAL STREAM HABITAT FORMS

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)						
IDEM	Sample #	bioSample #	Stream Name	Location		
	AS-1		Pigeon Creek	39.06617, -87.39377		
	Surveyor	Sample Date	County	Macro Sample Type	Habitat	
	Geo Tech	8/22/17	Warrick	MHAB, Fish	Complete	
						QHEI Score: 52

1) SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

BEST TYPES	OTHER TYPES	ORIGIN	QUALITY
PRESENT TOTAL % P R <input type="checkbox"/> BLD/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5]	PRESENT TOTAL % P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0]	PRESENT TOTAL % P R <input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LAQUSTRINE [0] <input type="checkbox"/> SHALE [-1] <input type="checkbox"/> COAL FINES [-2]	Check ONE (Or 2 & average) SIFT <input type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1] Substrate <div style="border: 1px solid black; padding: 5px; display: inline-block;">2</div>

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources ☐ 3 or less [0]

Comments

2) INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

% Amount	% Amount	% Amount	AMOUNT
12 1 UNDERCUT BANKS [1] 6 2 OVERHANGING VEGETATION [1] 20 2 SHALLOWS (IN SLOW WATER) [1] 5 1 ROOTMATS [1]	45 3 POOLS > 70cm [2] 1 1 ROOTWADS [1] 5 1 BOULDERS [1]	1 1 OXBOWS, BACKWATERS [1] 2 2 AQUATIC MACROPHYTES [1] 5 1 LOGS OR WOODY DEBRIS [1]	Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input checked="" type="checkbox"/> MODERATE 25 - 75% [7] <input type="checkbox"/> SPARSE 5 - < 25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1] Cover <div style="border: 1px solid black; padding: 5px; display: inline-block;">14</div>

Comments

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> NONE [6] <input checked="" type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]	<input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1]

Comments

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY	CONSERVATION TILLAGE
L R <input type="checkbox"/> NONE/LITTLE [3] <input checked="" type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]	L R <input checked="" type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]	L R <input checked="" type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian:

Comments

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0]	Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1]	<input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles.

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2] <input checked="" type="checkbox"/> BEST AREAS 5 - 10cm [1] <input type="checkbox"/> BEST AREAS < 5cm [metric = 0]	<input type="checkbox"/> MAXIMUM > 50cm [2] <input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> NONE [2] <input checked="" type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1]

Comments

6) GRADIENT (2.44 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

DRAINAGE AREA (207.8 mi²) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6]

% POOL: 40 % GLIDE: 35 % RUN: 20 % RIFFLE: 5

Comments

IDEM 07/06/10

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

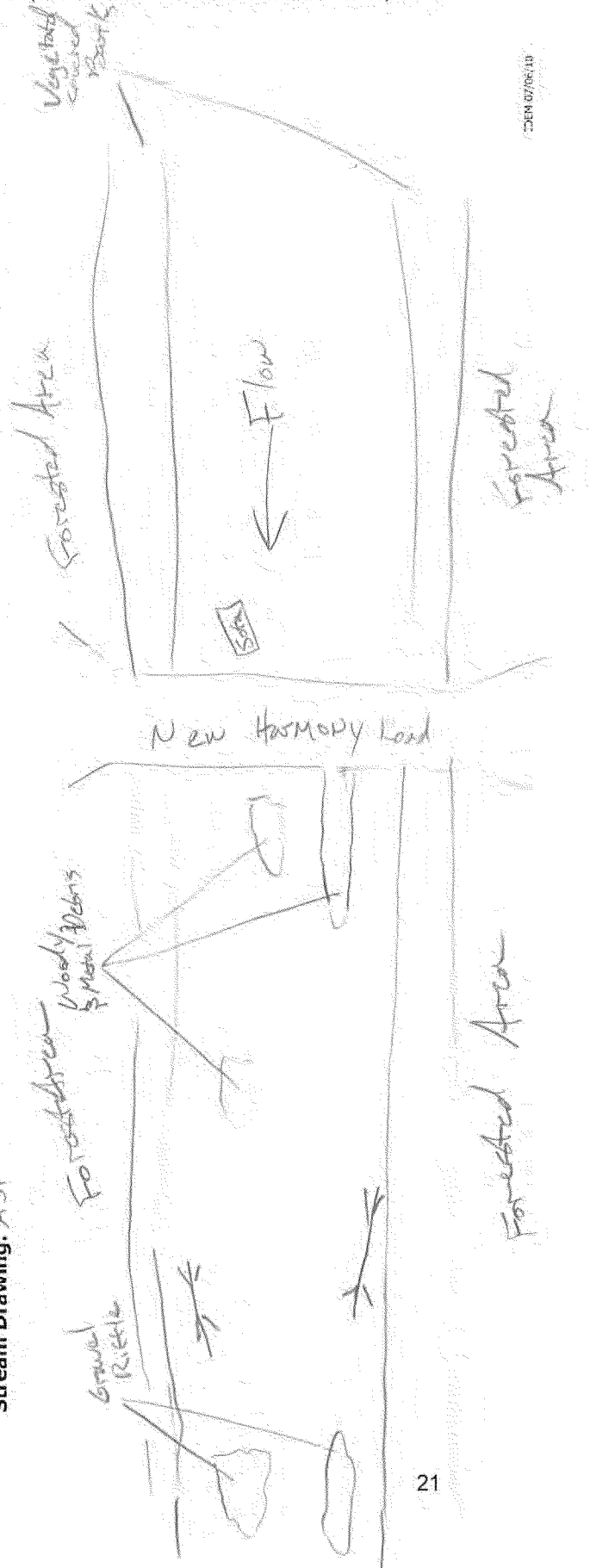
COMMENT

A-CANOPY	B-AESTHETICS	C-RECREATION	D-MAINTENANCE	E-ISSUES
<input type="checkbox"/> > 85% - Open <input type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input type="checkbox"/> Foam/Scum	<input type="checkbox"/> Oil sheen <input type="checkbox"/> Trash/Litter <input type="checkbox"/> Nuisance odor <input type="checkbox"/> Sludge deposits <input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Active <input type="checkbox"/> Historic <input type="checkbox"/> Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old <input type="checkbox"/> Spray <input type="checkbox"/> Islands <input type="checkbox"/> Scoured <input type="checkbox"/> Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified <input type="checkbox"/> Leveled: <input type="checkbox"/> One sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls <input type="checkbox"/> Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armour <input type="checkbox"/> Slumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill <input type="checkbox"/> BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling <input type="checkbox"/> Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table <input type="checkbox"/> Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry <input type="checkbox"/> Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

% open	Left	Middle	Right	Total Average
	—	—	—	—
	—	—	—	—

Stream Drawing: AS1



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

AS1
(3rd NORTH)

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>12</u>	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>19</u>	20 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>6</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	<u>6</u>	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>1</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	<u>1</u>	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>8</u> (LB)	Left Bank 10 9					<u>8</u> 7 6					5 4 3					2 1 0					
SCORE <u>8</u> (RB)	Right Bank 10 9					<u>8</u> 7 6					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					

Total Score 112

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

Sample # AS-2	bioSample # —	Stream Name Unalutka Tributary to Pigeon Cr.	Location 38.103602, -87.406135
Surveyor Curtis	Sample Date 8/22/17	County Wash. Co.	Macro Sample Type MHAB/Fish
Habitat Complete			QHEI Score: 45

1) SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

BEST TYPES		OTHER TYPES		ORIGIN		QUALITY	
P	R	P	R	P	R	P	R
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>						

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

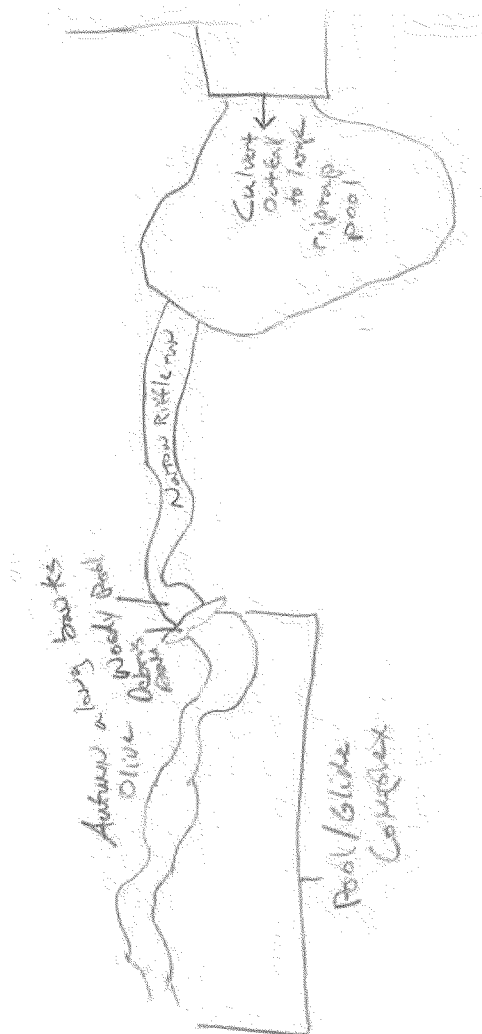
COMMENT _____

A-CANOPY <input type="checkbox"/> > 85% - Open <input type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input checked="" type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed		B-AESTHETICS <input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input checked="" type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input type="checkbox"/> Foam/Scum		C-RECREATION <div>Area</div> <div>Pool: <input type="checkbox"/> > 100 ft² <input type="checkbox"/> > 3 ft</div> <div>Depth</div>		D-MAINTENANCE <input type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Active <input type="checkbox"/> Historic Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old Spray: <input type="checkbox"/> Islands <input type="checkbox"/> Scoured Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Cutoffs Berleod: <input type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armoured <input type="checkbox"/> Stumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage		E-ISSUES <input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Coaling Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition	
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Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

% open	Left	Middle	Right	Total Average
_____ %	_____ %	_____ %	_____ %	_____ %
	X	X	X	

Stream Drawing: AS2



AS2
(4th North)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>8</u>	20 19 18 17 16	15 14 13 12 11	10 9 <u>8</u> 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>5</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<u>5</u> 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>12</u>	20 <u>19</u> 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>6</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	<u>6</u>	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>5</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	<u>5</u>	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>4</u> (LB)	Left Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
SCORE <u>4</u> (RB)	Right Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					

Total Score 88

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

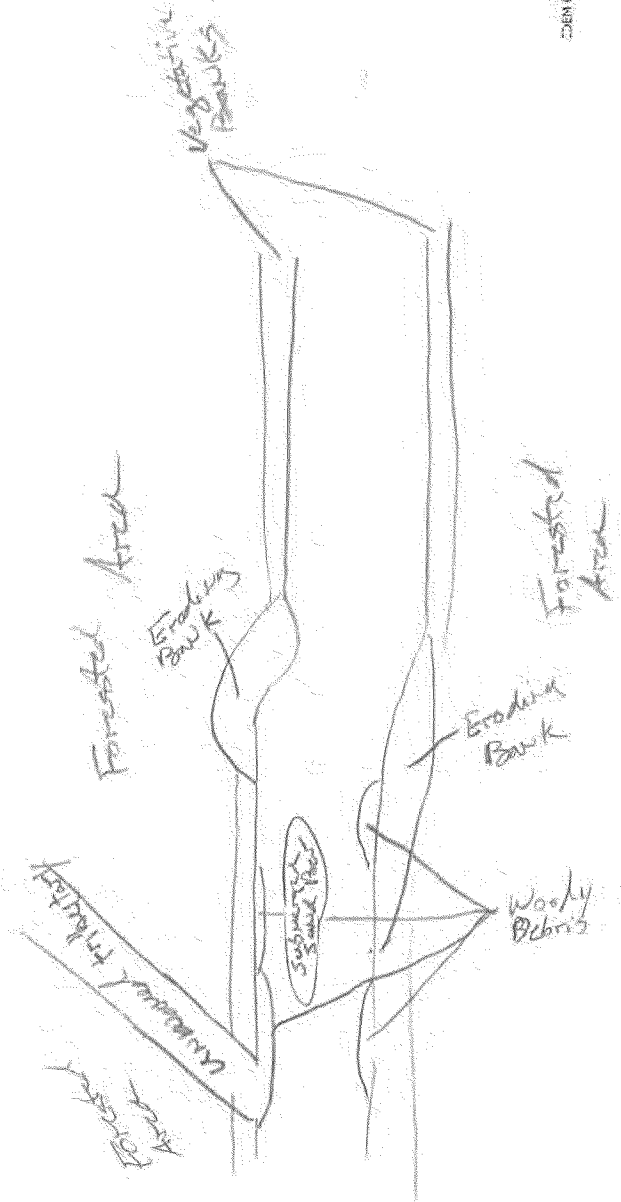
COMMENT _____

A-CANOPY	B-AESTHETICS	C-RECREATION	D-MAINTENANCE	E-ISSUES
<input checked="" type="checkbox"/> > 85% - Open <input type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input type="checkbox"/> Foam/Scum	Area <input type="checkbox"/> > 100 ft ² <input type="checkbox"/> > 3 ft Pool <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Oil sheen <input type="checkbox"/> Trash/Litter <input type="checkbox"/> Nuisance odor <input type="checkbox"/> Sludge deposits <input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Active <input type="checkbox"/> Historic Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old <input type="checkbox"/> Spray <input type="checkbox"/> Islands <input type="checkbox"/> Scoured Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armoured <input type="checkbox"/> Slumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition

Looking upstream (> 10m, 3 readings < 10m, 1 reading in middle); Round to the nearest whole percent.

Left	Middle	Right	Total Average
%	%	%	%
X	X	X	X

Stream Drawing: A63



JDEM 07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <i>5</i>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<i>(5)</i> 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <i>8</i>	20 19 18 17 16	15 14 13 12 11	10 9 <i>(8)</i> 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <i>14</i>	20 19 18 17 16	15 <i>(14)</i> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <i>10</i>	20 19 18 17 16	15 14 13 12 11	<i>(10)</i> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <i>16</i>	20 19 18 17 <i>(16)</i>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>8</u>	20	19	18	17	16	15	14	13	12	11	10	9	<u>8</u>	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>1</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	<u>1</u>	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>5</u> (LB)	Left Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
SCORE <u>5</u> (RB)	Right Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					

Total Score 102

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)					
Sample #	bioSample #	Stream Name	Location		
AS-5		Pigeon Cr.	38.16182, -87.415476		
Surveyor	Sample Date	County	Macro Sample Type	Habitat Complete	QHEI Score: 53
EcoTech	8/21/17	Warwick	MHAB, Fish	<input checked="" type="checkbox"/>	

1] **SUBSTRATE** Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

Check ONE (Or 2 & average)

BEST TYPES		OTHER TYPES		ORIGIN	QUALITY
P R	PRESENT TOTAL %	P R	PRESENT TOTAL %		
<input type="checkbox"/> BLDR/SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/> 15	<input type="checkbox"/> LIMESTONE [1]	<input checked="" type="checkbox"/> HEAVY [-2]
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/> MODERATE [-1]
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/> NORMAL [0]
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/>	<input type="checkbox"/> SILT [2]	<input type="checkbox"/> 25	<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/> FREE [1]
<input type="checkbox"/> SAND [6]	<input type="checkbox"/> 60	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/> EXTENSIVE [-2]
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>	(Score natural substrates; ignore)		<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/> MODERATE [-1]
				<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/> NORMAL [0]
				<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/> NONE [1]
				<input type="checkbox"/> COAL FINES [-2]	

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources ☐ 3 or less [0]

Substrate 6 Maximum 20

Comments

2] **INSTREAM COVER** Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

AMOUNT

Check ONE (Or 2 & average)

% Amount	Amount	% Amount	Amount	% Amount	Amount
<input type="checkbox"/> UNDERCUT BANKS [1]	<input type="checkbox"/> 10	<input type="checkbox"/> POOLS > 70cm [2]	<input type="checkbox"/> 2	<input type="checkbox"/> OXBOWS, BACKWATERS [1]	<input type="checkbox"/> 1
<input type="checkbox"/> OVERHANGING VEGETATION [1]	<input type="checkbox"/> 1	<input type="checkbox"/> ROOTWADS [1]	<input type="checkbox"/> 1	<input type="checkbox"/> AQUATIC MACROPHYTES [1]	<input type="checkbox"/> 1
<input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1]	<input type="checkbox"/> 1	<input type="checkbox"/> BOULDERS [1]	<input type="checkbox"/> 1	<input type="checkbox"/> LOGS OR WOODY DEBRIS [1]	<input type="checkbox"/> 1
<input type="checkbox"/> ROOTMATS [1]	<input type="checkbox"/> 1				

Cover 12 Maximum 20

Comments

3] **CHANNEL MORPHOLOGY** Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Channel 8 Maximum 20

Comments

4] **BANK EROSION AND RIPARIAN ZONE** Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right (looking downstream)		RIPARIAN WIDTH		FLOOD PLAIN QUALITY		CONSERVATION TILLAGE	
L R	EROSION	L R	WIDE > 50m [4]	L R	FOREST, SWAMP [3]	L R	CONSERVATION TILLAGE [1]
<input checked="" type="checkbox"/>	NONE/LITTLE [3]	<input type="checkbox"/>	MODERATE 10-50m [3]	<input type="checkbox"/>	SHRUB OR OLD FIELD [2]	<input type="checkbox"/>	URBAN OR INDUSTRIAL [0]
<input type="checkbox"/>	MODERATE [2]	<input type="checkbox"/>	NARROW 5-10m [2]	<input type="checkbox"/>	RESIDENTIAL, PARK, NEW FIELD [1]	<input type="checkbox"/>	MINING/CONSTRUCTION [0]
<input type="checkbox"/>	HEAVY/SEVERE [1]	<input type="checkbox"/>	VERY NARROW [1]	<input type="checkbox"/>	FENCED PASTURE [1]		
		<input type="checkbox"/>	NONE [0]	<input type="checkbox"/>	OPEN PASTURE, ROWCROP [0]		

Indicate predominant land use(s) past 100m riparian. 10 Maximum 10

Comments

5] **POOL/GLIDE AND RIFFLE/RUN QUALITY**

MAXIMUM DEPTH		CHANNEL WIDTH		CURRENT VELOCITY		Recreation Potential	
Check ONE (ONLY!)		Check ONE (Or 2 & average)		Check ALL that apply		(Circle one and comment on back)	
<input type="checkbox"/> > 1m [6]	<input type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]	<input checked="" type="checkbox"/> SLOW [1]	<input type="checkbox"/> PRIMARY CONTACT			
<input checked="" type="checkbox"/> 0.7 - < 1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> INTERSTITIAL [-1]	<input type="checkbox"/> SECONDARY CONTACT			
<input type="checkbox"/> 0.4 - < 0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	<input checked="" type="checkbox"/> FAST [1]	<input type="checkbox"/> INTERMITTENT [-2]				
<input type="checkbox"/> 0.2 - < 0.4m [1]		<input type="checkbox"/> MODERATE [1]	<input type="checkbox"/> EDDIES [1]				
<input type="checkbox"/> < 0.2m [0]							

Indicate for reach - pools and riffles. 7 Maximum 12

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH		RUN DEPTH		RIFFLE/RUN SUBSTRATE		RIFFLE/RUN EMBEDDEDNESS	
<input checked="" type="checkbox"/> BEST AREAS > 10cm [2]	<input type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input type="checkbox"/> NONE [2]				
<input type="checkbox"/> BEST AREAS 5 - 10cm [1]	<input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]				
<input type="checkbox"/> BEST AREAS < 5cm [metric = 0]		<input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]				
			<input checked="" type="checkbox"/> EXTENSIVE [-1]				

Riffle/Run 2 Maximum 8

Comments

6] GRADIENT (2.64 ft/mi) .05%		% POOL: 35		% GLIDE: 30		Gradient Maximum 10	
DRAINAGE AREA (192.4 mi ²)		<input type="checkbox"/> VERY LOW - LOW [2-4]	<input checked="" type="checkbox"/> MODERATE [6-10]	% RUN: 25	% RIFFLE: 10		
		<input type="checkbox"/> HIGH - VERY HIGH [10-6]					

Gradient 6 Maximum 10

IDEM 07/06/10

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input type="checkbox"/> Trash/Litter	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill	<input type="checkbox"/> BMPs
<input type="checkbox"/> 30% - < 55%	<input type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor	<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Scoured	<input type="checkbox"/> Logging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling	<input type="checkbox"/> Erosion
<input type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits	<input type="checkbox"/> Snag	<input type="checkbox"/> Removed	<input type="checkbox"/> Modified	<input type="checkbox"/> Bank	<input type="checkbox"/> Surface	<input type="checkbox"/> False bank	<input type="checkbox"/> Mature
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Leveed	<input type="checkbox"/> One-sided	<input type="checkbox"/> Both banks	<input type="checkbox"/> Relocated	<input type="checkbox"/> Outfalls	<input type="checkbox"/> Wash H ₂ O	<input type="checkbox"/> Tile
			<input type="checkbox"/> Bedload	<input type="checkbox"/> Moving	<input type="checkbox"/> Stable	<input type="checkbox"/> Armoured	<input type="checkbox"/> Slumps	<input type="checkbox"/> Mines	<input type="checkbox"/> Acid
			<input type="checkbox"/> Impounded	<input type="checkbox"/> Desiccated	<input type="checkbox"/> Flood control	<input type="checkbox"/> Drainage	<input type="checkbox"/> Flow	<input type="checkbox"/> Natural	<input type="checkbox"/> Stagnant
								<input type="checkbox"/> Wetland	<input type="checkbox"/> Park
								<input type="checkbox"/> Lawn	<input type="checkbox"/> Home
								<input type="checkbox"/> Atmospheric deposition	

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent.

	Left	Middle	Right	Total Average
% open	XX	XX	XX	

Stream Drawing:

IDEN 07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION <u>AS 6 (North) → ACTUALLY AS5</u>	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover: mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>4</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 <u>4</u> 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material; increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>16</u>	20 19 18 17 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE 4 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE 5 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 5 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE 9 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 9 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

Total Score 96

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

Sample # AS-6 bioSample # — Stream Name Pigeon Creek Location 38.06617, -87.30379

Surveyor Go Tech Sample Date 8/22/17 County Lorain Macro Sample Type MHAB, Fish ☒ Habitat Complete **QHEI Score:** 52

1] SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present. Check ONE (Or 2 & average)

BEST TYPES		OTHER TYPES		ORIGIN		QUALITY	
P R	PRESENT TOTAL %	P R	PRESENT TOTAL %	P R	PRESENT TOTAL %	P R	PRESENT TOTAL %
<input type="checkbox"/> BLDR/SLABS [10]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [4]	<input type="checkbox"/>	<input type="checkbox"/> LIMESTONE [1]	<input type="checkbox"/>	<input type="checkbox"/> HEAVY [-2]	<input type="checkbox"/>
<input type="checkbox"/> BOULDER [9]	<input type="checkbox"/>	<input type="checkbox"/> DETRITUS [3]	<input type="checkbox"/>	<input type="checkbox"/> TILLS [1]	<input type="checkbox"/>	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/>
<input type="checkbox"/> COBBLE [8]	<input type="checkbox"/>	<input type="checkbox"/> MUCK [2]	<input type="checkbox"/>	<input type="checkbox"/> WETLANDS [0]	<input type="checkbox"/>	<input type="checkbox"/> NORMAL [0]	<input type="checkbox"/>
<input type="checkbox"/> GRAVEL [7]	<input type="checkbox"/>	<input type="checkbox"/> SILT [2]	<input type="checkbox"/>	<input type="checkbox"/> HARDPAN [0]	<input type="checkbox"/>	<input type="checkbox"/> FREE [1]	<input type="checkbox"/>
<input type="checkbox"/> SAND [6]	<input type="checkbox"/>	<input type="checkbox"/> ARTIFICIAL [0]	<input type="checkbox"/>	<input type="checkbox"/> SANDSTONE [0]	<input type="checkbox"/>	<input type="checkbox"/> EXTENSIVE [-2]	<input type="checkbox"/>
<input type="checkbox"/> BEDROCK [5]	<input type="checkbox"/>			<input type="checkbox"/> RIP/RAP [0]	<input type="checkbox"/>	<input type="checkbox"/> MODERATE [-1]	<input type="checkbox"/>
				<input type="checkbox"/> LACUSTRINE [0]	<input type="checkbox"/>	<input type="checkbox"/> NORMAL [0]	<input type="checkbox"/>
				<input type="checkbox"/> SHALE [-1]	<input type="checkbox"/>	<input type="checkbox"/> NONE [1]	<input type="checkbox"/>
				<input type="checkbox"/> COAL FINES [-2]	<input type="checkbox"/>		

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources ☐ 3 or less [0]

Comments

2] INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

% Amount	COVER TYPE	% Amount	COVER TYPE	% Amount	COVER TYPE
<u>1</u>	UNDERCUT BANKS [1]	<u>2</u>	POOLS > 70cm [2]	<u>0</u>	OXBOWS, BACKWATERS [1]
<u>1</u>	OVERHANGING VEGETATION [1]	<u>0</u>	ROOTWADS [2]	<u>0</u>	AQUATIC MACROPHYTES [1]
<u>0</u>	SHALLOWS (IN SLOW WATER) [1]	<u>0</u>	BOULDERS [1]	<u>2</u>	LOGS OR WOODY DEBRIS [1]
<u>0</u>	ROOTMATS [1]				

Comments

3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4]	<input type="checkbox"/> EXCELLENT [7]	<input type="checkbox"/> NONE [6]	<input type="checkbox"/> HIGH [3]
<input type="checkbox"/> MODERATE [3]	<input type="checkbox"/> GOOD [5]	<input checked="" type="checkbox"/> RECOVERED [4]	<input type="checkbox"/> MODERATE [2]
<input type="checkbox"/> LOW [2]	<input type="checkbox"/> FAIR [3]	<input type="checkbox"/> RECOVERING [3]	<input checked="" type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> NONE [1]	<input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> RECENT OR NO RECOVERY [1]	

Comments

4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY
<input checked="" type="checkbox"/> EROSION	<input checked="" type="checkbox"/> WIDE > 50m [4]	<input checked="" type="checkbox"/> FOREST, SWAMP [3]
<input checked="" type="checkbox"/> NONE/LITTLE [3]	<input type="checkbox"/> MODERATE 10-50m [3]	<input type="checkbox"/> SHRUB OR OLD FIELD [2]
<input type="checkbox"/> MODERATE [2]	<input type="checkbox"/> NARROW 5-10m [2]	<input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1]
<input type="checkbox"/> HEAVY/SEVERE [1]	<input type="checkbox"/> VERY NARROW [1]	<input type="checkbox"/> FENCED PASTURE [1]
	<input type="checkbox"/> NONE [0]	<input type="checkbox"/> OPEN PASTURE, ROWCROP [0]

Indicate predominant land use(s) past 100m riparian.

Comments

5] POOL/GLIDE AND RIFFLE/RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!)	Check ONE (Or 2 & average)	Check ALL that apply	(Circle one and comment on back)
<input checked="" type="checkbox"/> > 1m [6]	<input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2]	<input type="checkbox"/> TORRENTIAL [-1]	<input type="checkbox"/> Primary Contact
<input type="checkbox"/> 0.7 - < 1m [4]	<input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1]	<input type="checkbox"/> VERY FAST [1]	<input type="checkbox"/> Secondary Contact
<input type="checkbox"/> 0.4 - < 0.7m [2]	<input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	<input type="checkbox"/> FAST [1]	
<input type="checkbox"/> 0.2 - < 0.4m [1]		<input type="checkbox"/> MODERATE [1]	
<input type="checkbox"/> < 0.2m [0]		<input type="checkbox"/> EDDIES [1]	

Indicate for reach - pools and riffles.

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2]	<input checked="" type="checkbox"/> MAXIMUM > 50cm [2]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2]	<input checked="" type="checkbox"/> NONE [2]
<input type="checkbox"/> BEST AREAS 5-10cm [1]	<input type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1]	<input type="checkbox"/> LOW [1]
<input checked="" type="checkbox"/> BEST AREAS < 5cm [metric = 0]		<input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> MODERATE [0]
			<input type="checkbox"/> EXTENSIVE [-1]

Comments

6] GRADIENT (2.64 ft/mi) ☐ VERY LOW - LOW [2-4] % POOL: 70 % GLIDE: 30 **Gradient Maximum** 10

DRAINAGE AREA (22.5 mi²) ☒ MODERATE [6-10] % RUN: X % RIFFLE: X

Comments

8/22/17

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Area	<input type="checkbox"/> Depth	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input checked="" type="checkbox"/> Trash/Litter	<input type="checkbox"/> > 100 ft ²	<input type="checkbox"/> > 3 ft	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban	
<input type="checkbox"/> 30% - < 55%	<input checked="" type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor			Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old		<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime	
<input checked="" type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits			<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill	
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls			Sneag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified		<input type="checkbox"/> BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment		
					Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks		<input type="checkbox"/> Logging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling
					<input type="checkbox"/> Relocated	<input type="checkbox"/> Outfalls	<input type="checkbox"/> Erosion:	<input type="checkbox"/> Bank	<input type="checkbox"/> Surface
					Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable		<input type="checkbox"/> False bank	<input type="checkbox"/> Manure	<input type="checkbox"/> Lagoon
					<input type="checkbox"/> Armoured	<input type="checkbox"/> Stumps	<input type="checkbox"/> Wash H ₂ O	<input type="checkbox"/> Tile	<input type="checkbox"/> H ₂ O Table
					<input type="checkbox"/> Impounded	<input type="checkbox"/> Desiccated	Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry		
					Flood control <input type="checkbox"/> Drainage		Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant		
							<input type="checkbox"/> Wetland	<input type="checkbox"/> Park	<input type="checkbox"/> Golf
							<input type="checkbox"/> Lawn	<input type="checkbox"/> Home	
							<input type="checkbox"/> Atmospheric deposition		

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

Left	Middle	Right	Total Average
% open _____	% _____	% _____	% _____

Stream Drawing: *AS6*

DEM.07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

A56
(5/24/2018)

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME _____ PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present; usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE <u>1</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE <u>7</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>7</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE <u>8</u> (LB)	Left Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
SCORE <u>8</u> (RB)	Right Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE <u>10</u> (LB)	Left Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0
SCORE <u>10</u> (RB)	Right Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0

Total Score 107

APPENDIX C.

RAW DATA-WATER CHEMISTRY, MACROINVERTEBRATES, FISH



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-01
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-1

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	313 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.16 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-02
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-2

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	280 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-03
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-3

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	256 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	11.7 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-05
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-6

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	255 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.18 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	23.0 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-04
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-5

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	344 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by

Raw Macroinvertebrate data collected 8/28-29/2017 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

AQUATIC SITE				AS1	AS2	AS3	AS5	AS6
DATE				8/29/17	8/29/17	8/29/17	8/28/17	8/29/17
SPECIES	T.V.	F.F.G.	Habit					
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae								
<i>Girardia (Dugesia) tigrina</i>					1			
MOLLUSCA								
Bivalvia								
Veneroida								
Corbiculidae								
<i>Corbicula fluminea</i>	6	FC		8				6
Gastropoda								
Basommatophora								
Physidae								
<i>Physella sp.</i>	8	SC		1		1		
ANNELIDA								
Oligochaeta	8	GC	bu					
Clitellata								
Tubificida								
Naididae								
Naidinae								
<i>Nais pardalis</i>	8	GC			1			
Tubificinae w.o.h.c.	10	GC	bu	1	1		3	
Pristininae								
<i>Pristina sp.</i>	8	GC			1			
<i>Pristina aequiseta</i>	8	GC			3			
Rhyacodrilinae								
<i>Branchiura sowerbyi</i>	6	GC	bu		3		1	
ARTHROPODA								
Arachnoidea								
Acariformes								
Oribatei								
							1	
Crustacea								
Amphipoda								
Talitridae								
<i>Hyalella azteca</i>	8	GC	cr	5		6		9

Asellidae								
<i>Caecidotea sp.</i>	8	GC	cr	2				
Insecta								
Collembola								
Sminthuridae								1
Ephemeroptera								
Baetidae								
<i>Callibaetis floridanus</i>		GC		3		10	1	3
Caenidae								
<i>Caenis sp.</i>	3	GC	sw		4		1	
Odonata								
Calopterygidae								
<i>Calopteryx sp.</i>	4	PR						2
<i>Hetaerina sp.</i>	3	PR					1	
Coenagrionidae							1	
<i>Argia sp.</i>	5	PR		1	4	3		1
<i>Enallagma sp.</i>	9	PR		2	1	6	1	1
<i>Ischnura sp.</i>	9	PR	cb	2	1	4		1
Corduliidae								
<i>Epithea princeps</i>		PR	sp			2		
<i>Macromia sp.</i>	2	PR		1				
Libellulidae				1		1		
<i>Erythemis sp.</i>	2	PR		2				
<i>Libellula sp.</i>	9	PR						1
<i>Pachydiplax longipennis</i>		PR						3
Heteroptera								
Belostomatidae		PR		2				
Gerridae		PR						
<i>Aquarius</i>		PR	sw			1		
Nepidae								
<i>Ranatra sp.</i>		PR				3		
Megaloptera								
Corydalidae								
<i>Corydalus cornutus</i>	2	PR		3			1	
Trichoptera								
Hydropsychidae							4	4
<i>Hydropsyche sp.</i>	4	FC	cn	10	1	1	9	4
<i>Cheumatopsyche sp.</i>	3	FC	cn	57	87		79	20
Hydroptilidae								
<i>Hydroptila sp.</i>	3	SC	cn				6	2
<i>Neotrichia sp.</i>	4	SC					4	
Polycentropodidae								
<i>Neureclipsis sp.</i>	3	FC		1			1	

Coleoptera								
Dytiscidae		PR				1		
Elmidae								
<i>Stenelmis sp.</i>	5	SC	cn			1		
Gyrinidae								
<i>Dineutus sp.</i>	4	PR		2				8
Halipilidae								
<i>Peltodytes sp.</i>	7	SH	cb				1	1
Hydrophilidae								
<i>Berosus sp.</i>	7	PR		1			2	
Diptera								
Chaoboridae								
<i>Chaoborus punctipennis</i>						1		
Chironomidae	6	FC				1		
Chironominae								
Chironomini								
<i>Chironomus sp.</i>	8	GC	bu	1		1	59	
<i>Cryptochironomus sp.</i>	5	PR	sp			1	7	1
<i>Cryptotendipes sp.</i>	4	GC	bu			2		
<i>Dicrotendipes</i>								
<i>neomodestus</i>	5	FC		5		12	10	4
<i>Endochironomus sp.</i>	6	SH	cn			1		
<i>Glyptotendipes sp.</i>	6	FC	bu	3	82	1		2
<i>Parachironomus sp.</i>	4	PR	sp		1	1		
<i>Paracladopelma sp.</i>	7	GC					3	
<i>Phaenopsectra obediens</i>								
group		OM				2		
<i>Polypedilum flavum</i>				28	3		3	4
<i>Polypedilum halterale</i>								
group						1		
<i>Polypedilum illinoense</i>								
group	7			23	1	24	133	39
<i>Polypedilum sp.</i>		SH	cb		1			
<i>Tribelos fuscicorne</i>							7	1
<i>Tribelos jucundus</i>								1
Pseudochironomini								
<i>Pseudochironomus sp.</i>							59	
Tanytarsini								
<i>Cladotanytarsus sp.</i>	4	GC	cb	1		1		
<i>Paratanytarsus dissimilis</i>						2		
<i>Rheotanytarsus exiguus</i>								
gp.		FC			11			
<i>Tanytarsus sp.</i>	4	FC	cb	1	3	2	3	6
Orthoclaadiinae								

<i>Corynoneura sp.</i>	4	GC	sp	1			
<i>Cricotopus bicinctus</i>	7	OM		3		14	2
<i>Rheocricotopus robacki</i>	4			1			
<i>Thienemanniella xena</i>	4	GC					2
Tanypodinae							
<i>Ablabesmyia mallochi</i>	5	OM		6	10	3	4
<i>Ablabesmyia rhamphe</i>							
group				9	5		2
<i>Conchapelopia sp.</i>	4	PR		20	5	66	7
<i>Labrundinia sp.</i>	4	PR	sp		1		
<i>Procladius sp.</i>	7	PR	sp	4	8	7	8
<i>Telopelopia okoboji</i>	4			5			
Empididae						1	
<i>Hemerodromia sp.</i>			sp			3	
Muscidae	6	PR				1	
Simuliidae							
<i>Simulium sp.</i>	5	FC	cn		2		

Raw fish data collected 8-29-17 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Species	Common Name	AS 1	AS2	AS3	AS5	AS6	Family/Group	IBI Trophic Guild Assignment	IBI Sensitivity	Repro. Guild	Pioneer?	Schooling?
Ameiurus natalis	yellow bullhead		1				Ictaluridae	V	T	C		
Amia calva	bowfin			1			Amiidae	C		C		
Aphredoderus sayanus	pirate perch			1			Aphredoderidae	V		M		
Cyprinella whipplei	steelcolor shiner				11		Cyprinidae	V		M		TRUE
Gambusia affinis	mosquitofish				1	12	Poeciliidae	V		N		
Ictalurus punctatus	channel catfish			1			Ictaluridae	C	T	C		
Lepomis cyanellus	green sunfish	4	5	7	8		Sunfish	V	T	C	TRUE	
Lepomis gulosus	warmouth	2	4	1		1	Sunfish	C		C		
Lepomis macrochirus	bluegill	10	15	3		4	Sunfish	V		C		
Lepomis megalotis	long-eared sunfish	4		3		2	Sunfish	V	SI	C		
Lepisosteus osseus	longnose gar				1		Lepisosteidae	C	T	M		
Micropterus punctulatus	Kentucky bass	1		1	1	1	Centrarchidae	C		C		
Micropterus salmoides	largemouth bass		4				Centrarchidae	C		C		
Percina sciera	dusky darter				1	1	Percidae	V	S	S		
Phenacobius mirabilis	suckermouth minnow	4			20		Cyprinidae	V		S		TRUE
Pimephales notatus	bluntnose minnow	5			7		Cyprinidae	D	T	C	TRUE	TRUE
# individuals		30	29	18	50	21						
# species		7	5	8	8	6						
% deformed		3.33%	3.45%	0.00%	0.00%	0.00%						
Total Individuals							77					

* exotic species

IBI Trophic Guild Assignment = Detritivore-D, Omnivore-O, Invertivore-V, Insectivore-I, Carnivore-C

IBI Sensitivity = Sensitive-S, Intolerant-I, Both Sensitive & Intolerant (SI), Tolerant-T

Reproductive Guild = Simple lithophil-S, Complex with parental care-C, Simple miscellaneous-M, Complex with no parental care-N

APPENDIX D.

DATA TABLES OF PREVIOUS SURVEY EFFORT (2011)-WATER CHEMISTRY,
MACROINVERTEBRATES, FISH

Appendix D Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Stream	Flow Regime	Bankfull Width (ft)	Mean Bankfull Depth (ft)	Slope	Channel Material	RBP Score	Rosgen Stream Type*
AS1	6	Per	45.1	2.7	0.03	Silt	126	F5/F6
AS2	5	Int	6.5	0.3	0.01	Gravel	47	C6
AS3	11	Per	63	2.6	0.02	Silt	126	F5/F6

*Rosgen 1996

Appendix D Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana as compared to Indiana NPDES discharge standards and Minimum Surface Water Quality standards.

Parameter	AS1	AS2	AS3	NPDES Discharge Limits	Surface Water Quality Standards
Temperature (°C)	17.5	17.5	18.9	≤32.2	≤32.2
Flow Rate (ft/second)	0.72	0.31	1.12	NA	NA
pH	8.3	8.8	8.4	6.0 - 9.0	6.0 - 9.0
Total Dissolved Solids (mg/L)	1588	863	1129	NA	<750
Total Acidity (mg/L as CaCo3)	<10	<10	<10	NA	NA
Total Alkalinity (mg/L as CaCo3)	380	330	280	NA	NA
Total Iron (mg/L)	0.79	0.1	0.47	<6.0	NA
Total Manganese (mg/L)	0.19	0.02	0.066	<4.0	NA
Total Suspended Solids (mg/L)	39	24	25	<70	NA

Appendix D Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Taxa	8	1	19	1	18	1
Number of Individuals	26	1	86	1	129	3
Number of EPT Taxa	1	1	1	1	3	1
% Orthocladiinae + Tanytarsini of Chironomidae	0.0%	5	0.0%	5	14.3%	5
% Non-insects Minus Crayfish	5.4%	5	19.8%	3	9.3%	5
Number of Diptera Taxa	1	1	6	1	3	1
% Intolerant	7.7%	1	11.6%	1	39.5%	5
% Tolerant	11.5%	5	14.0%	3	0.8%	5
% Predators	42.3%	5	59.3%	5	20.9%	3
% Shredders + Scrapers	15.4%	3	15.1%	3	31.0%	5
% Collector-Filterers	7.7%	5	11.6%	3	36.4%	1
% Sprawlers	0.0%	1	3.5%	3	0.0%	1
Total Scores		34		30		36

*<36=impaired, >36=unimpaired.

Appendix D Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Species	13	5	7	1	18	5
Number of Minnow Species	2	3	1	1	5	3
Number of Sunfish Species	5	5	2	3	5	5
Number of Sucker Species	0	1	0	1	0	1
Number of Sensitive Species	0	5	0	1	1	1
% Tolerant	21%	5	50%	3	22%	5
% Omnivore	5%	5	2%	5	4%	5
% Insectivore	84%	5	98%	5	84%	5
% Pioneer	11%	5	NA		NA	
% Carnivore	NA		2%	1	13%	3
Total # Individuals	62	1	148	3	85	1
% Simple Lithophilic Individuals	2%	1	0%	1	1%	1
% Individuals with Deformities	2%	3	1%	5	0%	5
Total Scores		44		30		40
Qualitative Rating*		Fair		Poor		Fair

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish

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11. CUMULATIVE ACTIVITY

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Section 404 Guidelines, a cumulative impacts analysis that details the changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for the wetland should include direct, cumulative, and secondary impacts from previous and current actions, as well as impact to surface and groundwater hydrology from future actions. An evaluation of the following information demonstrates that activity associated with this project has minimal impacts compared to the overall impacts to the cumulative watersheds. To evaluate the impact within the cumulative watersheds, the Seven Hills Mine (current permit) will be combined with a controlled reserve area north of the permitted area that covers approximately 576 acres. This combined impact area of 1,688.83 acres will be annotated as the ***Seven Hills Project*** in the following section.

Cumulative Impacts Addendum: Since the inception and administration of the Section 404 regulatory program, UMC has cooperatively adhered to standards set forth by the rules and regulations. We have always worked under guidance of the USACE to ensure that we are in compliance with the intended goals and policy, i.e. to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (WOTUS). While mining has contributed to some temporal loss of WOTUS in the Highland-Pigeon watershed in the past, present, and reasonably foreseeable future, in comparison to other land use types, it has had far less overall effect.

Using GIS research, soils that are mapped as hydric according to USDA/NRCS were isolated within the HUC 8. According to the Indiana Geological Society, surface mining through 2009 impacted 6,911 acres of land that were mapped hydric. This equates to 4.8% of the hydric soils in the watershed or 2.1% of the entire HUC 8 area. The remaining amount of surface mining conducted through 2009 totaling 30,797 acres was conducted in locations that were not classified as hydric which equates to 9.1% of the watershed. In other words, of the 11.2% of the watershed that has been impacted by surface mining, only 2.1% has occurred in soils mapped as hydric. Areas mapped with hydric soils do not necessarily indicate that wetlands are or have been present, however it does suggest that there is a higher likelihood that at least some wetlands were present or are currently present.

Surface Mining Through 2009	Acres	% of Hydric Acreage in HUC 8	% of Total HUC 8 Acreage
Non-Hydric Soils	30,797	N/A	9.1%
Hydric Soils	6,911	4.8%	2.1%
Total	37,708	N/A	11.2%

Comparatively, according to USDA/NRCS land use types, cultivated crops constitute 91,391 acres of mapped hydric soils in the watershed. That constitutes 64.1% of the mapped hydric soils of the Highland-Pigeon watershed or 27.1% of the entire watershed. Therefore, it may be inferred that cultivated crops impact 13.2 times the amount of mapped hydric land areas as surface mining.

Land Use Type	Total Acres	% of Hydric Acreage in HUC 8	% of Total HUC 8 Acreage
Cultivated Crops	91,391	64.1%	27.1%
Developed	25,610	18.0%	7.6%
Pasture/Hay	2,452	1.7%	0.7%
Total	119,453	83.8%	35.5%

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Furthermore, these agricultural impacts, that have unquestionably impacted the chemical, physical, and biological integrity of WOTUS, do not necessitate mitigation to offset for the temporal loss of functions associated with lost or impaired water features. Conversely, since 1982, the AML Program was established to restore early mining impacts (see section titled Abandoned Mine Lands) and today, as stated previously, the mining industry is required to adhere to current regulatory programs requirements. In fact, because mitigation ratios are inflated to offset for temporal loss and offsite mitigation is most often needed, it is prior converted cropland that is often sought after by mining companies to restore back to hard mast forested wetlands. In addition, all current mitigation is required to be permanently protected by deed attached documentation. As a result of many mining projects, more areas that were once WOTUS that have been cleared and farmed for generations are now being restored to their original condition and protected in perpetuity.

Cumulatively, agricultural practices have had considerable more impact to the watershed than has mining. In fact, as seen on the table above, even developmental land uses constitute a greater percentage of mapped hydric soils than do mining (nearly four times). Development impacts may or may not have mitigation associated with them. Subsequently, one could take the position that because these historic impacts have had such a large effect on WOTUS that no further impacts should occur or at the least be limited. However, mining is required where the resource exists. It is sometimes still necessary to impact WOTUS despite modern mining techniques (see section titled Alternatives Analysis). As such, the regulatory programs are in place to moderate future impacts and we continue to work with USACE to operate within program guidelines.

We have taken USACE feedback and impacts to WOTUS into consideration to maximize avoidance and minimization to the greatest extent possible while still accessing the resource. Currently, we are avoiding 374.67 acres of wetland and 17,129 linear feet of stream. We are proposing approximately 522.03 acres of wetland mitigation offsite to offset temporal loss (based on the proposed ratio in the mitigation resolution package submitted on May 17, 2017 with 348.02 acres of wetland and 40,275 linear feet of stream onsite. The offsite mitigation can again be seen as a reclaiming of previously lost WOTUS and a net benefit to the overall watershed long-term as it will be protected indefinitely.

The table below further illustrates land use types according to USDA/NRCS in the HUC 8. Specifically, this table shows the remaining deciduous forest, woody wetland, shrub/scrub, and emergent wetland in areas mapped as hydric.

Land Use Type	Total Acres	% of Hydric Acreage in HUC 8	% of Total HUC 8 Acreage
Deciduous Forest	16,842	11.8%	5.0%
Woody Wetland	3,547	2.5%	1.1%
Shrub/Scrub	12	0.0%	0.0%
Emergent Wetland	674	0.5%	0.2%
Total	21,075	14.8%	6.3%

With the proposed direct wetland impacts totaling 348.02 acres, the proposed permit disturbs less than 2.1% of the forested wetlands and less than 1.7% of the total Highland-Pigeon Creek watershed wetlands as well as approximately less than 1% of the forested wetlands in the Ecoregion.

At the conclusion of the Seven Hills Mine, a potential of up to 522.03 acres of additional forested wetlands will be added to the total above for an increase in the overall watershed to 5.2%. Impacts are short-term in the temporal context and the vegetation lost during the operation is predominately non-target, and erosion is always controlled according to SMCRA standards.

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The necessity of healthy ecosystems and the efforts to conduct restoration stands at the forefront of modern society. However, little effort has been proposed to conduct landscape level restoration in this watershed in the past, present, or reasonably foreseeable future. This is likely because landscape-scale restoration is so expensive that it can never occur without the necessary incentive; that incentive exists with the Seven Hills Mine.

This project holds the ability to reshape and restore the entire mine area. UMC has great interest in conducting high-quality restoration. They are far more in favor of restoring healthy streams and wetlands established in native vegetation than leaving behind a typical reclaim site. As such, we can be considered as an ally to the environmental community.

Because this proposed operation will contribute a cumulative benefit to the local ecosystem, it can actually be viewed as an opportunity for ecosystem restoration. As such, it is important for all stakeholders to consider that landscape level ecosystem restoration of this watershed is a complimentary by-product of the proposed mining operation. In closing, this project undoubtedly produces a considerable net cumulative benefit, both economically and ecologically, to the Highland Pigeon Creek watershed.

Watershed

The sections that follow the watershed analysis describe the factors that may be impacted by the development of the **Seven Hills Project**. Cumulative impacts will be considered for the Clear Branch-Pigeon Creek 12-digit HUC watershed as well as the Highland-Pigeon Creek 8-digit HUC watershed.

The activities authorized for the **Seven Hills Project** will occur within one 8-digit HUC watershed: the Highland-Pigeon (05140202) and one 12-digit HUC watershed: Clear Branch-Pigeon Creek (051402020203). The Highland-Pigeon drains southwest Indiana via Pigeon Creek to the Ohio River. The Highland-Pigeon watershed begins north, in the town of Princeton in Gibson County, intersects the Ohio River, and terminates to the south in several Kentucky counties. Pigeon Creek is located in Gibson, Warrick, and Vanderburgh Counties and flows southeast approximately 30 miles to the project area. At this point it flows south for about seven miles before turning southwest for approximately 20 miles, ultimately forming its confluence with the Ohio River on the south side of Evansville, Indiana. Adjacent watersheds in Indiana include Patoka (N-NE), Lower Ohio-Little Pigeon (E-SE), and the Lower Wabash (W).

The following tables show the percentages of watershed that will be permitted and held by reserve for the **Seven Hills Project**.

12-Digit HUC Watershed Cumulative Impact Summary			
Watershed	Watershed Area	Seven Hills	Percent of Watershed
	(acre)	(acre)	(percent)
Clear Branch-Pigeon Creek	22,960	1,688.83	7.4

8-Digit HUC Watershed Cumulative Impact Summary			
Watershed	Watershed Area	Seven Hills	Percent of Watershed
	(acre)	(acre)	(percent)

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Highland-Pigeon (Indiana only)	235,520	1,688.83	0.7
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Approximately 7.4% of the Clear Branch-Pigeon Creek watershed could be directly impacted by the **Seven Hills Project**. The majority of the impacts will occur under the submitted Seven Hills permit (#S-00357). The reclaimed lands will be returned to land uses commensurate with the pre-mine conditions. Reclaimed land will include forested wetlands, agriculture, forests, pastures, wildlife habitat, and open water.

Land Resources

The **Seven Hills Project** is located in the Southern Wabash Lowlands Ecoregion which is characterized by an undulating landscape consisting of many wide, shallow valleys. Stream channels are typically low to medium gradient. This broad, undulating lowland was formed in non-resistant, non-calcareous sedimentary rock which was partially glaciated. Many wide, flat-bottomed, terraced valleys occur and are filled with alluvium as well as outwash, eolian, and lacustrine deposits. Patterns of land use vary within the ecoregion. Drained alluvial soils are farmed while un-drained valleys are used for pasture or remain wooded, though the latter remains mostly in scattered patches. Upland soils are used for farming and livestock. The original vegetation included mixed mesophytic forest to the west, swamp forest to the south, and oak-hickory forests in drier upland areas with isolated prairies scattered throughout. Today, the productive soils support corn, soybean, wheat, and vegetable farming with scattered wooded areas. Extensive surface coal mining has also occurred in this ecoregion as it is located along the rim of the Illinois Basin where coal deposits outcrop or occur at easily recoverable depths.

The following tables summarize the various land covers within the local 12-digit HUC watershed covered by the **Seven Hills Project** and the adjacent regional 8-digit HUC watershed along with the acreage that has been previously affected by mining. Within the **Seven Hills Project**, approximately 648.5 acres or 28.8% of the permit area has been previously mined with all of it confined to the Seven Hills Mine area.

12-Digit HUC Watershed Land Cover Summary								
Watershed	Watershed Area	Previously Affected by Mining	Agriculture including Pasture	Forest / Wildlife	Developed	Water/ Wetlands	Undeveloped	Source of Information
	(acre)	(acre)	(percent)	(percent)	(percent)	(percent)	(percent)	
Clear Branch-Pigeon Creek	22,960	10,940	49	37	6	8	0	USGS 2001, IGS 2009

8-Digit HUC Watershed Land Cover Summary								
Watershed	Watershed Area	Previously Affected by Mining	Agriculture including Pasture	Forest / Wildlife	Developed	Water/ Wetlands	Undeveloped	Source of Information
	(acre)	(acre)	(percent)	(percent)	(percent)	(percent)	(percent)	
Highland-Pigeon (Indiana only)	235,520	38,143	59	21	16	4	0	USGS 2001, IGS 2009

As shown by the above tables, agriculture is a significant land use in the Highland-Pigeon watershed as well as the immediate Clear Branch-Pigeon Creek watershed.

In the Southern Wabash Lowlands, crop and livestock production have impacted stream water quality and stream habitat due to erosion off the cultivated fields. A number of farmers incorporate soil conservation

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practices to retain topsoil, but many fail to do so. The following table shows the cropping conditions that were practiced in 2011 for Warrick County, which has an area of 250,200 acres.

2013 Warrick County Cropping Practices ¹²		
Practice	Soybeans	Corn
	(acre)	(acre)
No Till	17,100	10,000
Mulch Till	800	800
Reduce Till	8,000	8,700
Conventional	12,100	21,600
Total:	42,500	38,000

As shown by the above table, the conventional farming practice is the primary method used for corn and accounts for a substantial portion of soybean production. This practice has impacted water quality ever since modern-day farming began utilizing larger tracts of land and modern machinery. Agricultural ditches were dug along field borders to facilitate farming while field tiles were installed to speed drainage of the fields. Runoff from exposed fields rapidly deposits sediment and soil amendments into adjacent streams affecting the overall water quality of the local watersheds and the region.

Based on the hydric soils and current stream density of the target watershed it is estimated that the 12-digit HUC watershed would yield a factor of approximately 0.209 acre of wetland per acre and a stream length of approximately 14 linear feet per acre. Hydric soils are strong indicators of wetland presence. The length of time required to convert to and from hydric soils makes these appropriate surrogates for previously known wetlands when estimating past effects. Using these factors, current agricultural practices including crops and pasture lands (11,250.4 acres) have affected approximately 2,351.3 acres of wetlands and 157,506 linear feet of streams within the 12-digit Clear Branch-Pigeon Creek watershed.

The water quality in the local watersheds and region would greatly improve if more farmers would participate in conservation tillage practices. Conservation practices would reduce the amount of sediment introduced into the streams, decrease the amount of airborne dust, slow down runoff, and decrease the need for abundant field conditioners required for crop production. Recent trends point to an increase in conservation farming practices and a decrease in conventional tillage practices.

Coal mining associated with the ***Seven Hills Project*** is a temporary use of the land. A reclamation plan which outlines the types and location of the post-mining land uses is required as a part of the SMCRA permit. The Indiana SMCRA program requires that no prime farmland be lost and that minimal forest loss occur. As such, impacts to these land uses will only be temporary. Reclamation activities will be conducted simultaneously with the mining operations to minimize the area of disturbance. All disturbed areas will drain to a sedimentation basin to ensure the appropriate quality of drainage from the ***Seven Hills Project*** area.

Coal Resources

Along with agriculture, coal mining is another large part of the economy in southwest Indiana, although the areal impacts are comparably minor. Statistics for Warrick County show that 121,690 acres¹³ (48.6%) of the county is occupied by farms and used for crops or permanent pasture compared to the approximately 80,662 acres (32.2%) as determined by the Indiana Coal Mine Information System that have been previously affected by mining with many of these acres overlapping due to modern reclamation practices that limit loss of agricultural land.

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Warrick County has a rich heritage of coal mining. The earliest recorded mine (1818) was mentioned by Will Fortune in his history of Warrick County¹⁴. However, coal mining as an industry began in 1850 with the construction of the Phelps's Coal Bank with surface coal mining becoming prevalent after 1963 based on review of USGS maps. The Indiana state geologist's report for 1898 provides some interesting statistics. Of the approximately 391 square miles of Warrick County, it is estimated that approximately 350 square miles is underlain by coal, 175 square miles of which is recoverable. The estimated total tons in these deposits was placed at 2 billion tons and at the time of the report the estimated amount of recoverable coal still unmined was 345 million tons.¹⁵ A more recent estimate of the Indiana *Coal-7* (Danville, Upper Millersburg) and Indiana *Coal-5* (Springfield) coal beds in Warrick County approximates reserves at 958.23 million tons.¹⁶

Due to the geographic location in the Illinois Basin, both underground and surface mining have affected land in the receiving watersheds. The following table shows the approximate surface effects in acres for the respective watershed. Areas previously affected by mining are those that have been either reclaimed or abandoned by any company. Areas currently affected by mining include the actively working open pit, locations of coal preparation and handling activity and areas that do not have topsoil yet placed over the spoil. Underground mining activities that include locations of surface support facilities and coal preparation and handling activity are also included. Areas currently affected by mining include operations by all companies in the area, not just United Minerals Company, LLC. It should be noted that information on potentially affected by mining acreages for other coal mine operators within the watersheds is not known. Only the permitted surface mine-able reserves are listed for United Minerals.

12-Digit Cumulative Surface Effects Summary							
Watershed	Watershed Area	Previously Affected by Mining	Watershed Previously Affected by Mining	Currently Affected by Mining	Watershed Currently Affected by Mining	Potentially Affected by Mining	Watershed Potentially Affected by Mining
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
Clear Branch-Pigeon Creek	22,960	10,940	47.7	155	0.7	4,062.5	15.2

The ***Seven Hills Project*** reserve could exceed 20 million tons (approximately 20,000 tons per acre if coal thicknesses remain consistent). The actuality of mining this potential reserve is dependent on many variables including the ability to acquire property, future market conditions, public policy, energy demand, coal quality and coal thickness, etc. The acquisition of land and coal contracts is a competitive business and very capital intensive. The further in advance capital is spent, the less return on investment is realized. Therefore, mining companies have attempted to manage land purchasing to coincide with needs for permitting and mining. In the present market, utility companies are less willing to make long-term commitments than in the past.

Stream and Wetland Impacts from Past and Future Mining

On average, the estimated direct impact to jurisdictional waters will be comparable to other mine projects in the area. Where a higher percent of agricultural land is encountered, intermittent streams will likely be more prevalent, but overall stream length and quality would be expected to diminish. The project lies entirely in the Highland-Pigeon (Indiana only) watershed. Estimates for past and future mining wetland and stream impacts can be found in the following tables. These estimates represent actual wetland and stream measurements from the Seven Hills permit area and wetland and stream factors from potential mining in the watershed. These estimates are provided at the request of the Corps of Engineers; however, impacts could be much lower or higher due to many unknowns. They are comparable to the impacts of agriculture estimated for the same 12-digit watershed (See **Land Resources**).

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Based on the field verified natural area stream and wetland density of the Seven Hills Mine and the computed natural area stream and wetland density of the surrounding 12-digit watershed, the following table provides the estimated stream and wetland loss for the areas that have been previously affected by mining in the local watershed. These acreages and footages are estimated based on the approximate wetland and stream density and cannot be verified.

Estimated Stream and Wetland Impacts from Past Mining			
Watershed	Previously Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	10,940	153,160	2,286.5

Based on flown topography of the Seven Hills Project and field verified delineations of pending permits within the 12-digit watershed, the following table provides the estimated stream and wetland impacts for the potential mining areas within the 12-digit watershed.

Estimated Stream and Wetland Impacts from Potential Mining			
Watershed	Potentially Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	4,062.5	153,160	700

Before implementation of the Surface Mining Control and Reclamation Act of 1977 (SMCRA), little consideration was given to stream replacement. After 1977, reclamation was focused on reclaiming land to support a productive use which emphasized controlling sedimentation and erosion control through the use of terraces, swales, and water and sediment control basins. Past mining in Indiana appears to have decreased the overall stream length, but greatly increased wetland and open water acreages. Many of these areas, such as the nearby Blue Grass Fish and Wildlife Area, are unique natural resource areas that provide and maintain quality hunting, fishing, and wildlife watching opportunities for local citizens and visitors. It has only been recently that natural stream design has been required by regulatory agencies.

A portion of the previously affected acreage in the Highland-Pigeon watershed predates any law or regulation to reclaim the mined land to the standards of today. This lack of reclamation has resulted in discharge of sediment, acid mine drainage and other compounds into surface waters which has contributed to several of the receiving streams being listed on the 303(d) list for impairments¹⁷. However, a TMDL performed in 2011 for the Pigeon-Highland watershed does not mention mining and focuses on E. coli and impaired biotic communities mainly associated with farming and publically owned treatment works (POTWs). Mining effects in the watershed are negligible. It should be noted that Indiana coal operators pioneered strip mine reclamation in the United States when a group of early miners banded together to form the Indiana Coal Producers Association in 1918. They decided to revegetate the spoil banks they had created with the primary focus on reforestation to obtain a cash crop and for aesthetics. Most of the early plantings, starting in 1926 were primarily locust with some hardwoods. Not all coal companies adopted this reclamation practice until 1941 when the state of Indiana enacted the second strip mine legislation in the nation requiring that all companies make reclamation and reforestation efforts and requiring them to obtain permits and secure bonds to ensure compliance. The law included a provision for active coal companies to reforest an additional percent of previously stripped land than they mined each year to help in revegetating lands that had been abandoned without any attempt at reclamation or reforestation. Approximately three miles west-southwest of the Seven Hills permit area, the Blue Grass

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Fish and Wildlife Area was created from approximately 2,500 acres of reclaimed coal land purchased from the Amax Coal Company by the state. It now serves as an outdoor recreation area and is especially popular among bird watchers.

According to the Indiana Geological Survey - Coal Mine Information System¹⁹, the previously mined areas adjacent to the Seven Hills Mine were mined by the Ayrshire Mine (west) and Lynnville (east) Mine. The Ayrshire Mine was in operation from 1973 to 1989 and the portions of the Lynnville Mine adjacent to the Seven Hills Mine area were in operation from 1987 and 1990 to 1996. The areas within the permit boundary have all been reclaimed which included grading of the spoil, covering it with stockpiled soils, and revegetating it with the appropriate vegetation for the approved post-mining land use. Based on knowledge of replaced soil thicknesses on previously mined reclaimed areas, it is likely that soil depths range from 0-15 inches, many areas consisting of best available material (BAM) (spoil/soil mix). Today the primary land features are large final cut pit impoundments and forest and wildlife habitat. In areas where intense compaction of the spoil and soil did not occur such as in forest and wildlife areas, surface water infiltration and horizontal migration from the surface water impoundments are enhancing the groundwater recharge and increasing base flow in receiving streams within the disturbed area.

A review of surface water baseline data above the proposed site and extensive adjacent past mining and below these sites does not show a significant difference for typical mining parameters. This provides evidence that past mining is not having a significant negative effect on Pigeon Creek water quality.

Abandoned Mine Lands (AML)

Areas north, east, and south of the **Seven Hills Project** have been heavily mined since the 1970s. Visible signs of historic mining such as spoil piles and pit lakes still exist throughout the region. A large percentage of this land area was mined prior to the Surface Coal Mine Control and Reclamation Act of 1977 resulting in ungraded spoil ridges which are now heavily vegetated and are providing wildlife habitat.

While the State of Indiana has historically required reclamation of coal mined lands since 1941, these laws had varying requirements until the federal SMCRA law was passed in 1977. The Abandoned Mine Lands (AML) Program with the Indiana Department of Natural Resources Division of Reclamation has been in service since 1982 and has been responsible for the restoration of many acres of hazardous and unproductive land. SMCRA provided for the collection of fees on active coal mining to fund this restoration and elimination of these hazards. In Indiana, the program is funded by tonnage fees from underground (13.5 cents per ton) and surface (31.5 cents per ton) mines. Approximately \$25 million has been spent on AML reclamation projects in Warrick County as of 2010²⁰.

The Office of Surface Mining (OSM) ranks the AML sites into five categories based on the level of hazard the site poses. Priority 1 and 2 are the most serious AML problems which pose a threat to the health, safety, and general welfare of the public, Priority 3 are AML problems impacting the environment, Priority 4 involves public facilities, and Priority 5 includes the development of publicly-owned lands. Approximately \$107 million has been spent on AML projects in Indiana as of 2009. The Abandoned Mine Lands Program is actively working on plans and restoration projects in the area. Thousands of acres in southwest Indiana have been reclaimed and the area will only increase. These lands are being returned to a productive state while reducing sediment, erosion, and acid mine drainage into the receiving waters. The Seven Hills Mine which at full production will produce 0.8 million tons of coal a year will contribute a minimum of \$252,000 per year to the AML fund to remedy those adverse effects of past coal mining conducted prior to SMCRA.

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National Pollutant Discharge Elimination System (NPDES)

All surface disturbances for the Seven Hills Mine permit will be minimized to the maximum extent possible to conduct coal extraction through surface mining methods. For any discharges, United Minerals Company LLC will follow requirements established by Section 402 of the Clean Water Act through the National Pollutant Discharge Elimination System (NPDES) permitting process. All releases of water through discrete conveyances from a coal mining operation must be permitted, monitored, and reported under the NPDES program. Prior to initiating surface excavations, appropriate sedimentation basin and upstream collection channels will be constructed. Sedimentation basins will be constructed down gradient from mining and surface disturbance activities to collect surface runoff from any affected area. The sedimentation basins will have a minimum 10-hour detention time. Spillways will be designed and protected to minimize soil erosion by utilizing riprap, erosion control blankets or quickly germinating vegetation or combinations of these methods. Releases from sedimentation basins will be sampled, reported, and subject to NPDES effluent discharge limits.

Within the Highland-Pigeon watershed, there are several known and regulated point sources of pollution. Point source dischargers must apply for and obtain a National Pollutant Discharge Elimination System (NPDES) permit from the State of Indiana. The primary pollutants being released through a pipe, ditch, or other well defined points can be oxygen demanding wastes, nutrients, sediment, and possible toxic materials. The following table lists the number and type of NPDES permits within or near the affected watersheds as of January 9, 2012. Major dischargers are facilities that discharge over one million gallons per day or receive wastewater from a population greater than 10,000. There are no major dischargers within the smaller 12-digit watershed of the permit area.

Active NPDES Permits ²¹		
Watershed	Total NPDES Permits	Major Discharge Permits
Clear Branch-Pigeon Creek	2	0
Highland-Pigeon (Indiana only)	61	9

Within the smaller 12-digit watershed of the permit area, as well as the Highland-Pigeon watershed, there may be failing septic systems or septic systems that have been connected into field drainage tiles. In this rural area it is likely that many homes use septic systems for wastewater treatment. Failing septic systems are known sources of *E. coli* impairments in water bodies. Due to forested areas being concentrated along the stream corridors, wildlife can also cause impairments in water bodies from the *E. coli* in their wastes. Many animals such as deer, geese, ducks, raccoons, and turkeys spend time in or around water bodies contributing to their potential impairment. There are also smaller livestock operations within these watersheds that are not regulated under the confined animal feeding operation regulations, but could have an impact on the water quality.

Agricultural activities contribute much of the non-point pollution within the affected watersheds. Land clearing and conventional tilling of the land makes soil susceptible to erosion. Soil amendments such as pesticides and fertilizers can also be washed from the fields. Conservation tillage along with vegetated buffer strips along the streams and ditches would greatly minimize sediment and nutrient loads into the streams. In this rural permit area, runoff from urban and residential land use is not a large source of pollution for the immediate receiving waters. Runoff from impervious features such as roofs and roadways increases discharge to the receiving streams rather than allowing the rainfall event to soak into the ground. This increased discharge can accelerate stream bank erosion and sediment transport.

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These discharges occur from sediment basins which are located as close to the disturbance area as practicable and are monitored for pH, suspended solids, settleable solids and iron, thereby preserving downstream habitats. All disturbed areas would drain to a sedimentation pond to ensure acceptable quality of any drainage from the site. Prior to initiating surface excavations, appropriate sedimentation ponds and upstream collection channels will be constructed. Sedimentation pond spillways will be protected to minimize soil erosion by utilizing riprap, erosion control blankets or quickly germinating vegetation or combinations of these methods. Upon completion of construction of the sedimentation ponds, affected areas would be graded to drain to the sediment ponds. All discharges from the sedimentation ponds would be required to meet the numerical effluent limits for suspended solids, per the NPDES permit. Reclamation practices at coal mines such as the use of sediment basins, terraces and WASCOS have proven successful in reducing erosion and sediment loss. Best management engineering practices for erosion and sediment control will be implemented to prevent negative impacts to the waters outside of the area planned for mining. Riparian buffers will be reestablished adjacent to the stream mitigation and conservation tillage practices will be recommended to tenant farmers.

Changes in water quality are not expected to occur in any local impoundment during or following mining. Surface water uses in the area should be unaffected during or following mining. Restored streams are expected to incur temporary increases in concentrations in pertinent quality parameters/constituents immediately following receipt of reestablished channel drainage, returning to down-stream baseline monitoring levels following their stabilization and reclamation timeframes.

Surface runoff water quality from disturbed areas may be affected during mining. As with any earthmoving operation, increases may occur for the following analytes: total dissolved solids, calcium, magnesium, sodium, sulfate, iron, and manganese. The subject site will not have processing or extensive coal storage onsite. This will greatly reduce effects to surface water quality. Any effects from site disturbance should diminish rapidly as the site is reclaimed and eventually return to pre-mine ranges. Sediment basin construction and erosion control practices should reduce suspended solids concentrations in turn reducing iron or manganese that may result from the disturbance.

Nutrients and sediment will be reduced during mining. Erosion control techniques, BMPs and sediment basins are used to control total suspended solids (TSS). The permit limit of 30 mg/l will result in significantly less TSS in the surface water runoff than is produced pre-mine or on adjacent unaffected land (especially agricultural lands). Nutrients resulting from fertilizer application will be reduced during mining as a result of a hiatus in the farming operations. Additionally, a reduction in TSS will result in a reduction in nutrients.

Wetlands disturbed in this project are approximately 2 percent of the wooded wetlands in the Pigeon Creek watershed and therefore will not significantly affect the functions of wooded wetlands in this watershed as a whole.

Effluent from NPDES discharge points is proposed to meet all applicable state and Federal standards and is compatible with that in the receiving stream. Adherence to these limits will avoid adverse impacts from the proposed operations to the surface water quality of the receiving stream.

Water Quality

None of the waters in the **Seven Hills Project** area are on the Outstanding Rivers List for Indiana²². The Indiana Department of Environmental Management (IDEM) in accordance with Sections 305(b) and 303(d) of the Federal Clean Water Act (CWA) reports to the USEPA on the quality of Indiana surface water and provides a list of those waters that area assessed as not meeting applicable water quality standards, also known as impaired, or for which one or more designated uses which include recreational

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uses, aquatic life uses, fish consumption, and public water supply are threatened every two years. The resource quality of each assessment unit is determined by computing the level of support or attainment for each applicable designated use. For each assessment unit (i.e., stream or open water) and for each designated use applicable to that assessment unit, IDEM concludes one of two possible use-support levels: “Fully Supporting” or “Not Supporting”. Fully Supporting means the designated use is attained; Not Supporting means the designated uses were not attained.

There are no waters on the 2010 IDEM’s Section 305(b) or 303(d) list within the Clear Branch-Pigeon Creek 12-digit watershed. The following table provides information on impaired waters within the Highland-Pigeon 8-digit watershed.

2010 Indiana Department of Environmental Management 303(d) Combined Impaired Waters Summary ⁸		
Waterbody Name/Segment	Status	Cause of Impairment
Hurricane Creek (INE0223_02)	Listed	<i>E. coli</i>
		Nutrients
		pH
Pigeon Creek (INE0248_T1002, 24A_T1003, 24C_T1004, INE0225_T1029)	Listed	Impaired Biotic Communities
		Dissolved Oxygen
		<i>E. coli</i>
		Nutrients
		Mercury in Fish Tissue
Big Creek-Unnamed Tributary (INE0232_T1001)	Listed	PCBs in Fish Tissue
		<i>E. coli</i>
Bayou Creek (INE0272_00)	Listed	Dissolved Oxygen
Hovey Lake (INE02P1017_00)	Listed	PCBs in Fish Tissue

The status for the above designated uses is based on the interpretation of biological information, physiochemical water data, and physical-habitat information.

During the mining of the Seven Hills Project, fluctuations in the water quality may be ameliorated by the incorporation of sediment basins that will limit total suspended solids (TSS) in the effluent by detaining water long enough to allow the sediment to drop out prior to discharge. The use of sediment basins to reduce TSS is quite successful as indicated by USEPA’s recent addition of sediment basin technology to the requirements for the construction industry. The effluent standard for coal mines is 35 mg/l with the actual averages being much lower in similar settings for coal mines in Indiana. TSS in runoff from agricultural fields in Indiana has been measured up to 3500 mg/l. If you were to visit typical receiving streams for southern Indiana mines during a sizable rainfall event you would see clear water coming from a sediment basin and water often resembling chocolate milk in the actual streams. Sediment from agriculture is by far the major pollutant for Midwest streams. Although flows may be higher in the disturbed area due to the removal of vegetation they are moderated by the required sediment basins.

Bond release and the removal of sediment basins cannot occur until the acreage proposed for bond release is revegetated. Reclamation is conducted contemporaneously with the mining thus when bond release occurs and sediment basins are removed the wetlands have been restored. There is not a loss of sediment control during the process.

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Additionally, the permit baseline data for Pigeon Creek shows an average of 39 mg/l of TSS upstream and an average of 36 mg/l downstream of the permit. Typical TSS in discharges from mine sediment basins in southern Indiana are in the range of 15-20 mg/l. Mine sediment basins flow episodically - typically around 10 times a year depending on rainfall. During large precipitation events sediment basin discharges are TSS exempt but settleable solids are still limited. Baseline maximums for TSS in Pigeon creek were 470 mg/l upstream of the permit and 370 mg/l downstream.

Agricultural operations use fertilizer. This is a major source of increased nutrient loads in receiving streams. During mining, the fertilizer application will be reduced thus reducing nutrient loading downstream. Lower suspended sediment through the use of sediment basins will also significantly reduce nutrients.

Nutrient and sediment loads should be reduced during the mining operation and likely reduced post-mine as a result of erosion control measures incorporated in the reclamation.

From the findings document that accompanied the SMCRA permit issuance for the Seven Hills Mine, the following assessment was determined. “The consideration of effects of water discharges from the proposed operations, combined with existing water quality information including that from pre-law and post-law surface and underground coal mining operations, are not anticipated to cause significant adverse impacts to post-mining water quality (or quantity) beyond that which is present in the cumulative impacts assessment (CIA) in its pre-mining state.” With the conclusion being, “The assessment of the probable cumulative impacts of all anticipated coal mining in the cumulative impact area on the hydrologic balance finds the operations proposed under the permit (S-357) have been designed to prevent material damage to the hydrologic balance outside the permit area.”

Biological Quality

Biological quality was evaluated with assessments of regional watersheds by the Indiana Department of Environmental Management’s Biological Studies Section and project specific streams by Eco-Tech Consultants, Inc.

The Indiana Department of Environmental Management’s Biological Studies Section conducts ecological assessments of Indiana surface waters. Surveys conducted assess aquatic habitat quality, fish community health, and invertebrate community health. The following summarizes assessments that were conducted by IDEM within the Highland-Pigeon watershed (HUC 05140202). IDEM monitoring locations are shown in Figures 1. No monitoring locations exist in the southwestern portion of the watershed.

IDEM uses the *Qualitative Habitat Evaluation Index* (QHEI)²³ to assess the habitat quality of a stream in conjunction with macroinvertebrate and fish sampling. The QHEI uses six metrics to score the habitat quality: 1) substrate, 2) instream cover, 3) channel morphology, 4) riparian zone and bank erosion, 5) pool/glide and riffle/run quality, and 6) gradient. IDEM has determined that a QHEI total score of less than 51 indicates poor habitat. Results from IDEM’s QHEI assessments are shown in Table 1. The total scores ranged from 31 to 49 with an average score of 40.4 and a standard deviation of 4.5. This shows that the majority of sites are of relatively poor habitat quality with little variability across the watersheds. Average QHEI scores from six surveys at two sites located downstream of the Seven Hills permit area in Pigeon Creek were 38.3 and 41.

Habitat quality is generally a reflection of the surrounding land uses and management practices. In the Highland-Pigeon watershed, land use is predominantly agricultural vegetation (59 percent) followed by forest vegetation (21 percent), wetland vegetation and open water (4 percent), and urban (16 percent).

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Numerous land management practices occurred in the past that still impact the stream habitat quality today including, but not limited to, channelization of streams and removal of riparian buffers. These past management practices may be partially responsible for the low QHEI results.

For macroinvertebrate assessments, IDEM has developed a macroinvertebrate Index of Biotic Integrity (mIBI)²⁴. Sampling methods follow the USEPA *Rapid Bioassessment Protocols* (RBP)²⁵. In Indiana, a stream segment is non-supporting for aquatic life and considered “poor” or “very poor” use when the monitored macroinvertebrate community receives a mIBI score for multi-habitat (MHAB) samples of less than 36, for kick samples of less than 2.2, or for Hester/Dendy (HD) samples of less than 1.4. Results from IDEM’s macroinvertebrate sampling are shown in Table 2. Results show that, of the nine assessments, five show poor macroinvertebrate health and are non-supporting of the aquatic life use classification. Another one showed borderline results, with the mIBI result exactly equal to the threshold. Three of these sites are located on Pigeon Creek downstream of the Seven Hills permit area. These sites received scores as follows: 34, 34, and 36 (MHAB).

When assessing fish community quality, IDEM uses the *Index of Biotic Integrity* (IBI)²⁶ to define fish community characteristics. The IBI is based on 12 metrics that assess the community’s species and trophic composition and fish condition and health. For IDEM’s purposes of identifying impaired waters, an IBI score of less than 35 is considered non-supporting for aquatic life use. Results of IDEM’s fish assessments are shown in Table 3. Of the 15 assessments, only two sites show poor fish community health and are non-supporting of the aquatic life use classification. Neither of these sites was located downstream from the Seven Hills permit area.

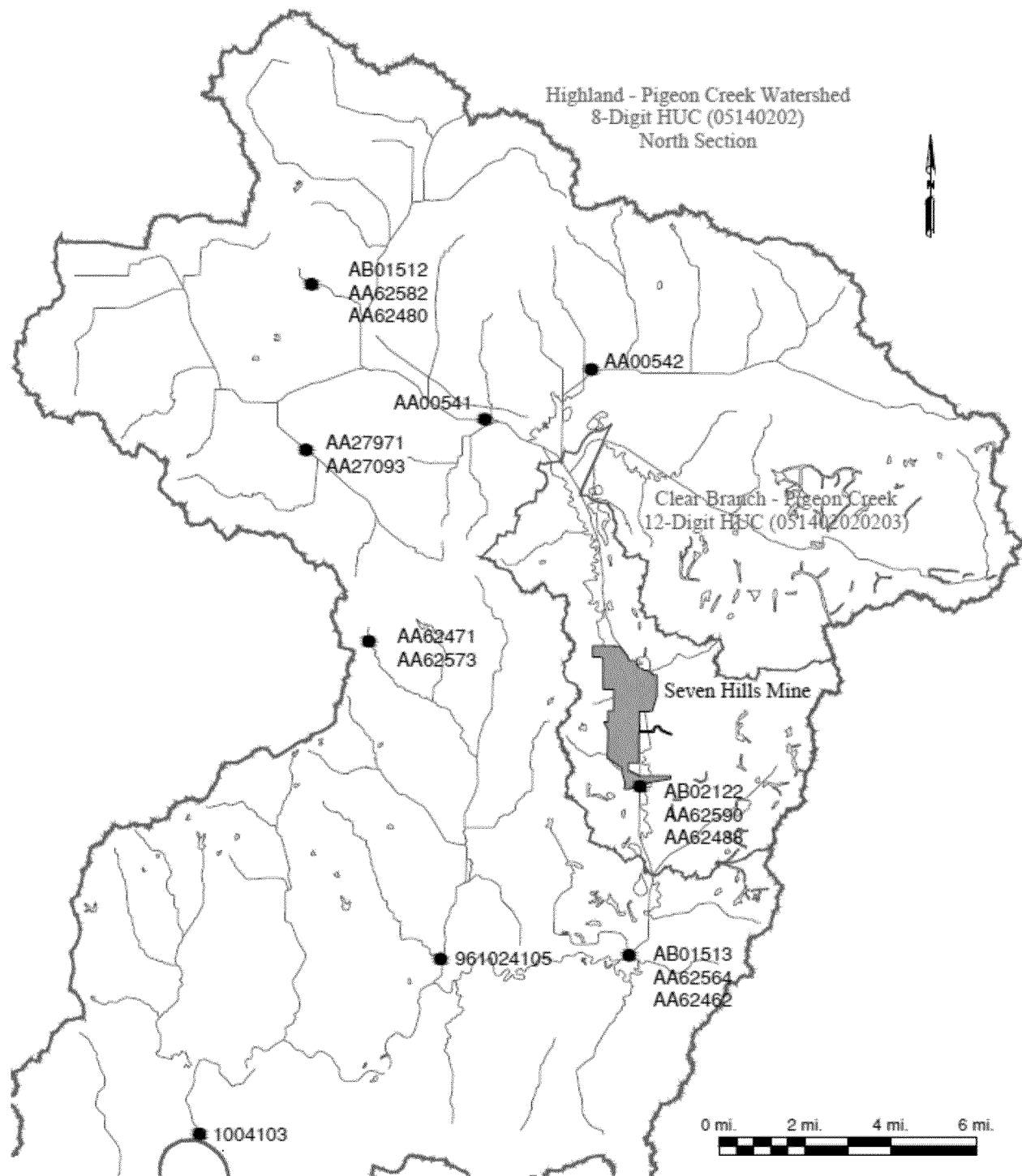
The majority of IDEM’s sampling results show poor quality habitat streams and the resulting poor aquatic life community health. During active mining, impacts to these watersheds would be minimized through regulatory mechanisms. The NPDES permitting program regulates water quality of effluent to ensure protection of applicable uses of the receiving streams, including aquatic life. All runoff from areas affected by mining flows through NPDES permitted sediment basins prior to discharge. Following active mining, the affected streams and wetlands will be mitigated to a higher quality than what currently exists. Mitigated streams are typically sinuous with instream habitat structures, riffle/pool complexes, rock beds, and adequate riparian buffers. The mitigated streams and wetlands will provide high quality habitat for aquatic life, inevitably improving the fish and macroinvertebrate community health in the area.

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Figure 1: IDEM macroinvertebrate and fish sampling locations within the northern portion of the Highland-Pigeon watershed.



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Table 1: IDEM QHEI assessment scores within the Highland-Pigeon 8-digit HUC watershed. Sites identified by light shade are located downstream of the Seven Hills Mine permit area and those with the darker shade are located within the Clear Branch-Pigeon Creek 12-digit HUC watershed.

Table 1: IDEM QHEI Assessment Scores within the Highland-Pigeon 8-Digit HUC Watershed												
IDEM Site ID	Sampling Section	Sample Date	Stream Name	HUC 12	Substrate Score	Stream Cover Score	Channel Score	Riparian Score	Pool/Glide Score	Riffle Run Score	Gradient Score	QHEI Total Score
AA00541	FISH	7/18/2000	Pigeon Creek	051402020106	13	13	7	4	4	0	4	45
AA00542	FISH	7/17/2000	Smith Fork Pigeon Creek	051402020107	8	12	6	4	4	0	4	38
AA27093	FISH	6/6/2005	Hurricane Creek	051402020101	8	9	10	6	7	0	4	44
AA62564	FISH	6/6/2010	Pigeon Creek	051402020204	0	12	9	7	8	0	6	42
AA62573	FISH	6/22/2010	Tributary of Bluegrass Creek	051402020301	14	10	5	6	0	2	6	43
AA62582	FISH	6/22/2010	Tributary of Pigeon Creek	051402020104	4	11	9	3	5	2	10	44
AA62590	FISH	6/6/2010	Pigeon Creek	051402020203	2	8	9	8	4	0	6	37
AB01512	FISH	8/10/2010	Tributary of Pigeon Creek	051402020104	7	7	10	5	4	0	10	43
AB01513	FISH	8/11/2010	Pigeon Creek	051402020204	0	8	9	7	8	0	6	38
AA27971	MACRO	8/1/2005	Hurricane Creek	051402020101	10	5	7	5	3	0	4	34
AA62462	MACRO	8/11/2010	Pigeon Creek	051402020204	5	8	8	8	8	0	6	43
AA62471	MACRO	7/26/2010	Tributary of Bluegrass Creek	051402020301	7	5	7	3	3	0	6	31
AA62480	MACRO	8/10/2010	Tributary of Pigeon Creek	051402020104	11	6	13	5	4	0	10	49
AA62488	MACRO	7/26/2010	Pigeon Creek	051402020203	0	6	9	9	9	0	6	39
AB02122	MACRO	7/26/2010	Pigeon Creek	051402020203	0	6	9	9	9	0	6	39

Table 2: IDEM macroinvertebrate IBI assessment scores within the Highland-Pigeon 8-digit HUC watershed. Sites identified by lighter shade are located downstream of the Seven Hills Mine permit area and those with the darker shade are located within the Clear Branch-Pigeon Creek 12-digit HUC watershed.

Table 2: IDEM Macroinvertebrate IBI Assessment Scores within the Highland-Pigeon 8-Digit HUC Watershed						
IDEM Site ID	Sample Date	Stream Name	HUC 12	Sample Type	mIBI Metric Score	Aquatic Life Use
001004103	10/4/2000	Pigeon Creek	051402020306	HD	1.8	
961024105	10/24/1996	Bluegrass Creek	051402020302	HD	1	Non-supporting
AA00542	7/17/2000	Smith Fork Pigeon Creek	051402020107	KICK	2.6	
AA27971	8/1/2005	Hurricane Creek	051402020101	MHAB	40	
AA62462	8/11/2010	Pigeon Creek	051402020204	MHAB	34	Non-supporting
AA62471	7/26/2010	Tributary of Bluegrass Creek	051402020301	MHAB	30	Non-supporting
AA62480	8/10/2010	Tributary of Pigeon Creek	051402020104	MHAB	34	Non-supporting
AA62488	7/26/2010	Pigeon Creek	051402020203	MHAB	34	Non-supporting
AB02122	7/26/2010	Pigeon Creek	051402020203	MHAB	36	

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Table 3: IDEM fish IBI assessment scores within the Highland-Pigeon 8-digit HUC watershed. Sites identified by lighter shade are located downstream of the Seven Hills Mine permit area and those with the darker shade are located within the Clear Branch-Pigeon Creek 12-digit HUC watershed.

Table 3: IDEM Fish IBI Assessment Scores within the Highland-Pigeon 8-Digit HUC Watershed					
IDEM Site ID	Sample Date	Stream Name	HUC 12	Total IBI Score	Aquatic Life Use
AA00541	7/18/2000	Pigeon Creek	051402020106	34	Non-supporting
AA00542	7/17/2000	Smith Fork Pigeon Creek	051402020107	34	Non-supporting
AA27093	6/6/2005	Hurricane Creek	051402020101	40	
AA62564	6/6/2010	Pigeon Creek	051402020204	12	Non-supporting
AA62573	6/22/2010	Tributary of Bluegrass Creek	051402020301	32	Non-supporting
AA62582	6/22/2010	Tributary of Pigeon Creek	051402020104	28	Non-supporting
AA62590	6/6/2010	Pigeon Creek	051402020203	42	
AB01512	8/10/2010	Tributary of Pigeon Creek	051402020104	18	Non-supporting
AB01513	8/11/2010	Pigeon Creek	051402020204	16	Non-supporting

Eco-Tech Consultants, Inc. conducted ecological assessments of select surface waters within the permit area and summarized their results in the report Stream Sampling and Assessment, Proposed Seven Hills Surface Mine, Warrick County, IN dated December 2011 (Appendix H).

The following table summarizes a portion of the Eco-Tech results conducted to evaluate macroinvertebrate community health, fish community health, aquatic habitat quality, and water quality at the Seven Hills site. The macroinvertebrate and fish were assessed using IDEM's Multi-habitat (MHAB) Macroinvertebrate Collection Procedure protocol and Surface Water Quality Assessment Program protocol. Aquatic habitat was assessed according to the EPA's Rapid Bioassessment Protocol (RBP). Water quality was sampled for total dissolved solids (TDS), pH, alkalinity, total iron, and total manganese. The results can be found in Appendix H.

Seven Hills Bio-Assessment Results					
Sample Point	mIBI (INmIBI)	fIBI	RBP	TDS (mg/L)	pH
AS1	34	44	126	1588	8.3
AS2	30	30	47	863	8.8
AS3	36	40	126	1129	8.4

This table is meant to provide an overall view of the biological quality of the streams as well as the potential sources of impairments. According to the IDEM'S Assessment Branch listing methodology for the Indiana 303(d) impaired waters list, an fIBI score of less than 36 indicates impaired biological communities and a INmIBI score of less than 36 designates a stream as not supporting aquatic life.

UMC has employed Eco-Tech, Inc. of Louisville, Kentucky to conduct a rapid terrestrial and aquatic biological assessment within both the permit area as well as in targeted locations within the Highland-Pigeon Creek watershed which will include vegetation classification and landscape analysis, terrestrial wildlife studies, small mammal trappings, remote camera monitoring, avian study, herpetofauna survey, as well as water quality and aquatic bioassessment. A scientific report will provide further information and analysis to address concerns regarding the biological component of the proposed project. Include in the report will be the methods, results, and discussion following the standard biological assessment report

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style. Tables, maps, and other exhibits will be presented as needed throughout the document. This information will be provided once it has been completed and results will be incorporated into the permit application.

Section 404 Impacts to Waters of the United States

The Section 404 permit application for the Seven Hills Mine covers effects to 1,679.6 acres for surface coal mining. The permit seeks approval for impacts totaling 44,395 linear feet of streams, 348.02 acres of wetlands, and 104.45 acres of open water. Compensatory mitigation is provided for these impacts and is included in this narrative.

Surface water flow will be affected as a result of these operations. During mining, sedimentation basins will be used to collect storm water runoff at the mine. Storm water will pass through the basins which control the rate of release of runoff and its sediment concentration by detaining it for a sufficient amount of time for sediment to settle out in the pond. This added detention time will decrease the peak flow from storm events resulting in a longer duration but reduced velocity flow to receiving streams. Reduced flow velocity generally benefits aquatic life. Several permanent incised impoundments will remain after mining is completed providing continued reduced flow velocities and refuge for aquatic life during droughts.

The higher porosity and permeability of the cast overburden may result in temporary increased infiltration of precipitation. This effect is moderated as weathering and settlement of the spoil occurs. Additionally, compaction by heavy equipment of replaced soils reduces infiltration. Compaction will be minimized where possible by direct haul-back of soil and mechanical ripping after soil placement. There will be a 550 ft undisturbed buffer between the mining and Pigeon Creek. The low hydraulic conductivity of the unconsolidated and the bedrock will prevent any near-term communication between the mine excavation and Pigeon Creek via groundwater. The flat hydraulic gradient and low conductivities should result in travel times on the order of hundreds of years through the undisturbed geology.

Because the ***Seven Hills Project*** area comprises only a small portion of the Pigeon Creek watershed, potential quantity impacts resulting from the proposed operation will be minimal.

Stream and wetland mitigation will take place as quickly as practicable employing the best techniques available to ensure success. Stream mitigation will be constructed utilizing natural channel design. Broad riparian buffers utilizing predominately hard-masted species will be planted adjacent to the stream mitigation enhancing both the habitat and water quality of the on-site, as well as downstream, streams. Wide floodplains will be incorporated adjacent to the stream mitigation, as post-mining land uses allow, which will benefit downstream property owners by providing flood control. Large forested wetlands will be constructed providing wildlife habitat, water filtration, and flood control. Mitigation areas will be monitored closely by well trained staff. Stream mitigation is a developing science, training will be ongoing, and consultants employed as needed. These mitigation measures will provide lift to the restored aquatic ecosystem and offset potential longer-term impacts. Peabody has demonstrated great success reclaiming streams in Indiana. The West Fork Busseron stream mitigation project at the Farmersburg Mine has been touted by the Office of Surface Mining as an example demonstrating that streams can be successfully replaced in surface mine reclamation.

Surface Hydrology

The ***Seven Hills Project*** is located in a portion of Warrick County, Indiana that has experienced past mining operations both pre-SMCRA and post-SMCRA. Characteristics of a typical area like this contains (but not limited to) numerous impoundments typically discharging to receiving streams and many streams

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that generally decrease in slope and increase in flow regime as reaches start out as ephemeral in the uplands through perennials in lowlands. The majority of the streams to be impacted are unnamed headwater tributaries to Pigeon Creek. These features flow from west to east and north to south. Streams flow in valley configurations until they reach the floodplain of Pigeon Creek where the stream grades flatten and they become more sinuous.

Potential exists for surface waters to be affected during active mining or reclamation periods. Water quality can be affected by exposure to fresh surfaces of broken rock, coal piles or sediment in runoff. Total dissolved solids, sulfate, iron, and manganese are typical parameters that may increase temporarily. NPDES effluent limits apply to water leaving the site. Diversions and sediment basins are proposed to intercept and/or contain runoff to treat and maintain surface water quality.

Analysis of indirect effects on adjacent wetlands resulting from open pit effect on the water table

When mining is conducted below the water table groundwater flow in the immediate area will be directed towards the excavation. In order to evaluate the potential effects of the Seven Hills mining excavation on the water table and adjacent wetlands a seepage analysis is conducted using analytic methods commonly used to evaluate groundwater flow or seepage towards open mine pits. The groundwater inflow to the mine void will be dependent on the local hydrogeologic conditions, particularly the hydraulic conductivity of the geologic units.

Hydrogeology

Soils

The major soil in the area of interest is the Bonnie silt loam. Soil types are generally reflective of the unconsolidated and bedrock geology. The Bonnie silt loam is characterized in the Soil Survey of Warrick County (U.S.D.A., 1979) as exhibiting low permeability. If there were major sand and gravel deposits present at the site you would expect coarser grained soils.

Unconsolidated materials

Unconsolidated materials beneath the soil upper horizons above the bedrock interface have not been well characterized in site borings. Most boring logs only report a thickness of “unconsolidated” however the borings with detail specify clay. A slug test performed on the unconsolidated section in the area found a horizontal hydraulic conductivity of 6.4×10^{-5} cm/sec. Typically, vertical hydraulic conductivities are an order of magnitude less, further slowing the drainage of the unit. These hydraulic conductivity values indicate finer grained materials such as fine silt or clay as indicated by soils and field observation. The thickness unconsolidated material along the eastern edge of the proposed pit ranges from approximately 33.5 - 34.8 ft (mean: 34.3 ft)(see borings A-8, A12, A-14, and A-20 within SMCRA Permit S-00357). These borings were drilled within the Pigeon Creek remnant paleochannel and the thickness of the unconsolidated material should be considered representative of the thickness within the avoidance area.

Bedrock

The bedrock in this area consists primarily of low permeability shale with lesser components of sandstone, limestone and coal. A slug test conducted on a bedrock well within the subject area indicated a hydraulic conductivity of 3.5×10^{-7} cm/sec. Hydraulic conductivity on the order of 1×10^{-7} cm/sec is the value required for landfill liners to be protective of groundwater. A range from 1×10^{-6} to 1×10^{-8} cm/sec is typical for southern Indiana bedrock. Again, the vertical conductivity would likely be an order of magnitude less.

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Methods

Seepage Calculations

Groundwater inflow or seepage into an open mine pit is commonly calculated in the mining industry using analytic solutions (Vanderruis et al., 1995). Two analytic solutions that are applied to flow within the unconsolidated zone are the Dupuit and the Dupuit-Forchheimer equations.

The Dupuit equation is used to calculate groundwater flow per unit width from an unconfined water table towards a seepage face (see Figure 1). Groundwater flow per unit width is calculated as follows:

$$q = \frac{K}{L} \frac{h_1^2 - h_2^2}{2} \quad (1)$$

Where:

q = flow per unit width (m^2/d)

K = hydraulic conductivity (m/d)

h_1 = head measured at the seepage face (m)

h_2 = head measured at the radius of influence (m)

L = distance between head measurements (m)

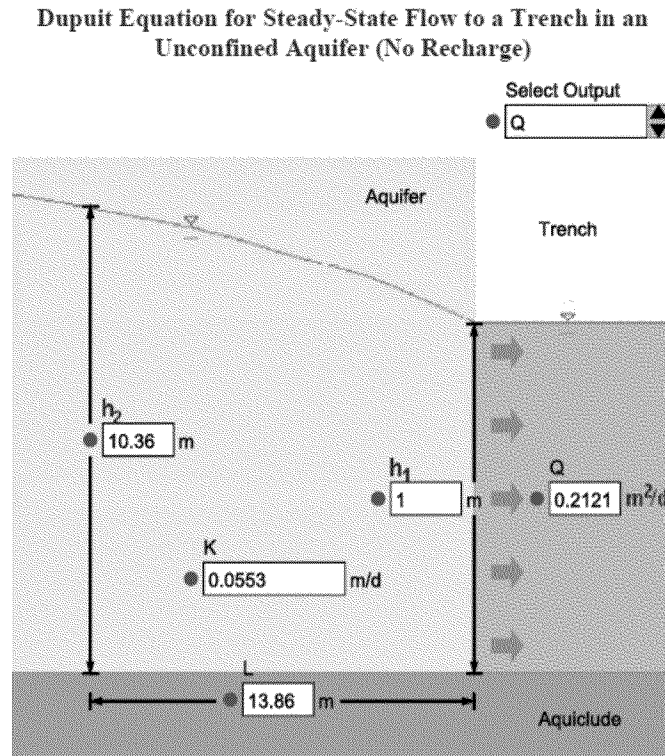
This equation assumes that aquifer is unconfined, isotropic, and of uniform thickness. The equation is dependent on the distance between the head measurements which can be estimated using the radius of influence calculations discussed later in this document. The flow per unit width can then be multiplied by the length of the open pit if evaluating one side of the mine excavation or the entire perimeter to estimate the total seepage into the mine void.

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Figure 1. Example of unconfined flow to a seepage face. This figure was borrowed from the Dupuit Equation Calculator tool developed by Robertson GeoConsultants, Inc available at www.edumine.com.



[http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-to-a-trench-in-an-unconfined-aquifer-no-recharge-/](http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-to-a-trench-in-an-unconfined-aquifer-no-recharge/)

Alternatively seepage into a mine excavation from an unconfined water table can be predicted using the Dupuit-Forcheimer equation. This method treats the mine void in the same manner as a group of wells that surround the periphery of the pit. The wells are then approached as a single large equivalent well which receives radial groundwater flow. In this scenario the groundwater is converging towards the open mine pit (or equivalent well) from a distant source (see Figure 2). The Dupuit-Forcheimer equation follows:

$$Q = \frac{\pi K (H^2 - h_w^2)}{\ln(R_0 / R_p)} \quad (2)$$

Where:

- Q = discharge into an open pit (m^3/d)
- K = hydraulic conductivity (m/d)
- H = head measured at initial water table (m)
- h_w = lowered water level in equivalent well or pit (m)
- R_0 = radius of influence (m)
- R_p = radius of equivalent well or pit (m)

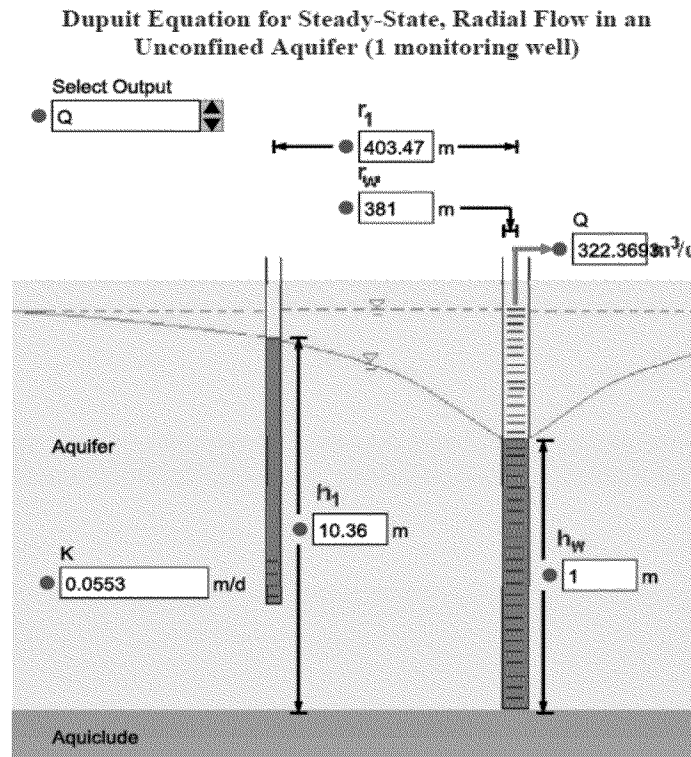
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This equation also assumes that aquifer is unconfined, isotropic, and of uniform thickness. The estimated seepage rate (Q) is dependent on the radius of the equivalent well or mine pit (R_p) and the radius of influence (R_0) of the mine excavation.

Figure 2. Example of Dupuit-Forcheimer equation for flow to an unconsolidated zone equivalent well or mine pit. This figure was borrowed from the Dupuit radial flow calculator tool developed by Robertson GeoConsultants, Inc available at www.edumine.com.



<http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-in-an-unconfined-aquifer-1-monitoring-well/>

To simplify the group of wells to an equivalent well (or open mine pit) the equivalent radius must be calculated. This can be estimated assuming a well of equal area:

$$R_p = \sqrt{\frac{a \cdot b}{\pi}} \quad (3)$$

Where:

R_p = radius of the equivalent well (or mine pit) m

a = width of the pit (m)

b = length of the pit (m)

Radius of Influence

The radius of influence, or the maximum distance at which drawdown can be detected with measuring devices in the field, can be estimated using empirical equations. Two that are commonly used for mining projects are the Kusakin and Sichardt equations.

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The Kusakin equation for the radius of influence is:

$$R_0 = 975 \sqrt{s} \quad (4)$$

Where:

R_0 = radius of influence (m)

s = maximal drawdown (m)

K = hydraulic conductivity (m/sec)

H = potentiometric surface prior to drawdown (m)

A more conservative estimate of the radius of influence is provided by the Sichardt equation:

$$R_0 = 3000 \sqrt{s} \quad (5)$$

Where:

R_0 = radius of influence (m)

s = maximal drawdown (m)

K = hydraulic conductivity (m/sec)

Equations 4 and 5 assume a steady-state has been reached and that the zone of influence is sufficient to supply the yield from the well (or mine void). Even if a direct source of recharge such as a pond or stream is not encountered, after some period of time the radius of influence will be expanding so slowly that it is considered to be effectively constant. This distance of influence is greater in higher permeability materials than in low permeability materials and will generally be greater for larger well drawdowns than for small drawdowns.

This seepage analysis is conducted only for the unconfined water table within the unconsolidated zone. The water table in the bedrock system is not expected to be in direct connection with the wetlands as the hydraulic conductivity of the bedrock (3.5×10^{-7} cm/sec) is nearly two orders of magnitude lower than the hydraulic conductivity of the unconsolidated material (6.4×10^{-5} cm/sec). Therefore the bedrock is considered to be an aquiclude and no flow boundary in this analysis. The thickness of unconsolidated material along the eastern edge of the proposed pit ranges from approximately 33.5 - 34.8 ft (mean: 34.3 ft)(see borings A-8, A12, A-14, and A-20 within SMCRA Permit S-00357). To simplify the analysis the thickness of the unconsolidated zone is set at 34 ft (10.36 m). Since the avoidance area consists of wetlands that exhibit periods of surface saturation throughout the year the head of the water table prior to mining (H) and adjacent to the mine pit at the radius of influence (h_2) were conservatively set at the same thickness as the unconsolidated material in the area 10.36 m (34 ft). The height of the seepage face (h_1) and lowered water level in the equivalent well/mine pit (h_w) were established at 1 m (3.28 ft). The drawdown(s) was then calculated to be 9.36 m (30.72 ft).

Results

Radius of Influence

The radius of influence (R_0) calculated from equations 4 and 5 ranges from 13.87 m to 22.47 m (Table 1). This indicates that the drawdown adjacent to the pit should terminate within the minimum 61 meter buffer that will separate the pit from the wetlands. It is important to note that this analysis is assuming that the unconsolidated zone is completely saturated and is therefore providing a maximum radius of influence. Furthermore this analysis does not incorporate the inundated drainage ditch and sediment

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basin that will be built within the interior of the levee between the levee and the mine pit (see Figures 3 and 4). Runoff from the upland areas will be directed through these structures which will remain continually inundated and act as a recharge source. This should further mitigate any potential dewatering within the avoidance area associated with the mining activities.

Table 1. Calculated Radius of Influence

Method	K (cm/sec)	H (m)	s (m)	R ₀ (m)
Kusakin	10.36	10.36	9.36	13.87
Sichardt	10.36	-	9.36	22.47

Notes

K: hydraulic conductivity

H: head measured at initial water table

s: maximal drawdown

Seepage into Mine Excavation

Estimates for seepage to the mine pit using the Dupuit-Foreheimer equation ranged from 322 – 517 m³/day (59 to 95 gpm) (Table 2). This is similar to the 299 to 485 m³/day (55 to 89 gpm) range estimated by multiplying the Dupuit equations discharge by the perimeter of the mine pit. The range in the seepage estimates are the result of the differences in the radius of influence calculated using equations 4 and 5. The seepage rate decreases as the radius of influence increases because the hydraulic gradient is reduced as the distance from the pit increases. The results of this analysis are based on the assumption that the unconsolidated zone is completely saturated outside of the radius of influence. It is not expected that this seepage rate will remain constant throughout the year as natural water table fluctuations will reduce the seepage rate during periods when there is not surface inundation. Therefore these estimates should be considered upper end values.

Table 2. Calculated Dewatering Volumes

Method	K (cm/sec)	H (m)	H _w (m)	h ₂ (m)	h ₁ (m)	R ₀ (m)	R _p (m)	L (m)	Q (m ³ /d)
Dupuit-Foreheimer	6.40E-05	10.36	1	-	-	394.87	381	-	517
		10.36	1	-	-	403.47	381	-	322
Dupuit	6.40E-05	-	-	10.36	1	-	-	13.87	485*
		-	-	10.36	1	-	-	22.47	299*

Notes

K: hydraulic conductivity

H: Head measured at initial water table

H_w: Hydraulic head in mine pit

h₂: head measured at radius of influence

h₁: head measured at seepage face

R₀: radius of influence

R_p: radius of mine pit

L: distance between head measurements

Q: seepage into mine void

* Dupuit discharge multiplied by the 2286 m mine pit perimeter

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Conclusion

Results of the seepage analysis indicate that seepage into the pit from the unconsolidated zone will be less than 100 gpm and that the drawdown adjacent to the pit (radius of influence: 13.87 to 22.47 m) should terminate within the minimum 61 meter buffer that separates the pit from the wetland area. These results are in line with Peabody's past long term experience of no significant offsite effects from open pit dewatering in areas of Southern Indiana where the geology has low permeability. While it is possible that offsite impacts could occur in areas where blanket sands are present we have clear empirical evidence of no offsite issues at multiple sites with low permeable geology including the Seven Hills area (east of Pigeon Creek), Francisco, and Columbia (Snakey Point in Patoka Fish and Wildlife Refuge) where we mined within 100-150 feet of important wetlands having borders of 8000 feet plus. All three of these sites (Francisco, Columbia and Seven Hills) have silt loam soils comprised of fine grained materials with low permeability overlying low permeability bedrock. In fact, Columbia has the exact same soil type as Seven Hills. We are not aware of this type of offsite impact being noted by DNR, OSM, landowners, IDEM, EPA or the USACE in the past. Further, DNR (with oversight from OSM) inspects mines continually for damage beyond the mining disturbance. This is a major component of SMCRA and offsite damage is detailed for Indiana in an annual OSM report. The fact that this report is specific to offsite damage further demonstrates that mines are being reviewed.

Based on the above facts and considerations we do not believe there will be significant impacts offsite resulting from the open pit effect on the water table or interaction with the stream/wetland. However, to provide assurance, we will include an adaptive management plan to address any unanticipated offsite impacts. Potential mitigation includes but is not limited to compaction of existing materials, addition of clay and placement cut off walls.

Groundwater

There are no known residential groundwater wells or wellhead protection zones that exist in or within 1,000 feet of the proposed Seven Hills permit area. The stratigraphic interval above and immediately below the lowest coal seam (Indiana *Coal-5* (Springfield)) to be mined is not known to contain significant aquifers for potable water use. The underclay and shale permeability averages 10^{-6} to 10^{-7} cm/sec. The low permeability of these strata limit the probability that any aquifers that may exist beneath the lowest coal seam to be mined can be affected by operations proposed for the **Seven Hills Project**. This conclusion is based on information obtained from a variety of sources including drilling, review of available water well records, extent of public water supply distribution lines, and talking with the local public. The local lithology above the coal seams to be mined consist of complexly interbedded and discontinuous shale and sandstone lenses exhibiting high clay content. Rocks displaying these characteristics are generally poorly suited for development as reliable sources of potable water.³⁰

Variables affecting soil recharge capacity include permeability of the underlying earth materials, ground slope, amount of vegetative cover, time of year, and evapotranspiration rate. Studies by Martin, et al, 1990, indicate hydraulic conductivity of the unconsolidated medium ranges between 10^{-7} to 10^{-4} cm/sec, with a median of 10^{-6} cm/sec. High clay content and complex bedding are the main factors creating the low-permeability properties of the unconsolidated layer. After mining and reclamation operations are completed, replaced soil infiltration may be slightly reduced as a result of compaction caused by the heavy equipment used to redistribute the earthen materials. Compaction will be minimized where possible by direct haul-back of soil. To help restore the recharge capacity of the mined area, replaced soil is chisel plowed and/or vibrated to reduce compaction. Post-mining land management practices such as terracing, moderation of slopes, revegetation, and production of crops are used to improve soil recharge capacity where applicable. Mine spoil generally exhibits higher recharge capacity than undisturbed

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material. Although this moderates in time due to settlement and weathering. Hydraulic conductivity of spoil in southern Indiana can range from 10^{-4} to 10^{-6} cm/sec.

SMCRA requires a detailed description of the groundwater monitoring program to be used during the mining and reclamation operations through the release of final bond. This data is evaluated to determine any effects of surface mining activities on the recharge capacity of reclaimed lands and on the quantity and quality of waters systems in and within 1,000 feet of the permit area. To comply with this requirement, groundwater wells are sampled and monitored within and adjacent to the permit to provide representative quality and quantity data for the following parameters: pH, total dissolved solids (TDS), total iron, total manganese, acidity, alkalinity, and water level.

Areas of previous mining north and east of the *Seven Hills Project* have resulted in large acreages of saturated spoil and interconnected final pit impoundments. These hydrologic systems developed during the mining process when the overburden was broken up by blasting and removed to recover the coal. The disrupted overburden, or spoil, which was originally solid rock became a heterogeneous mixture of particles ranging in size from clays to boulders. The transition of low permeability consolidated rock to moderately permeable unconsolidated spoil may temporarily increase groundwater recharge and storage capacity. These spoil areas may absorb increased recharge from precipitation and slowly release it as base flow to streams within the spoil and connected open water bodies. On the subject site there is an undisturbed barrier of 550 feet between Pigeon Creek and the mine excavation. Low hydraulic conductivities of the unconsolidated and bedrock units should prevent any increase in base flow to Pigeon Creek in the near term. The flat gradient and low hydraulic conductivities may result in travel times on the order of hundreds of years. Tributaries in the spoil are ephemeral in the upland and will be undisturbed in 550 ft barrier.

An evaluation of the hydrologic consequences of surface mining at the *Seven Hills Project* has determined that the operations proposed herein are unlikely to produce reliably measurable permanent changes in the quantity and quality of groundwater existing within the unconsolidated media inside or adjacent to the permit area. Due to increased permeability reclaimed spoil can result in a flattened water table but in this case the wetlands have a flat water table pre-mine. The post mine water table should not be significantly different. The difference in the permeability of the spoil and the undisturbed material may cause water to come to surface near this boundary. The permeability of spoil measured in MW-4 was reported on the order of 10^{-6} cm/sec. This spoil had settled for a number of years but and demonstrates that permeability's similar to undisturbed bedrock can be achieved with time.

Groundwater within the spoil interval may exhibit increased mineralization. This effect should be confined to the immediate mined area due to the low permeability of bedrock materials. The general chemical processes that occur as water moves through spoil are dissolution of calcite, dissolution of dolomite, consumption of oxygen, consumption and release of carbon dioxide, dissolution of pyrite and gypsum, precipitation of goethite (or iron hydroxide), and release of sodium ions by ion exchange.²⁸ This elevation in concentration diminishes with time.

Threatened and Endangered Species

United Minerals Company coordinated a review of potential impacts on threatened and endangered species through the SMCRA process. The Indiana Fish and Wildlife biologist assigned to the IDNR Division of Reclamation evaluated the SMCRA permit application and requested modifications to address the possible presence of listed species and to the extent possible minimize adverse impacts to any listed species pursuant to 312 IAC 25-4-29 and 25-4-46. Additionally, a Protection and Enhancement Plan was developed for the Indiana bat which was reviewed by the USFWS. The USFWS sent a letter to the IDNR Division of Reclamation dated October 28, 2013 that included, "The proposed project is in compliance with our 1996

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national biological opinion issued to the Office of Surface Mining for protection of federally endangered species, pursuant to Section 7 of the Endangered Species Act.”

In a presentation at the 2008 National Meeting of the American Society of Mining and Reclamation in Richmond, Virginia a study was conducted that compared coal mining and Indiana bat populations. From the study, it was concluded that there was not a consistent trend between coal mining and bat population related to changes in levels of coal mining activity, total coal production (size of the mine), or mining method (surface versus underground). It was found that in the State of Indiana, bat populations increased from 1966 to 2007, while also having a 100% increase in coal production primarily through surface mining methods. While there will be temporary impacts to the bat habitat for the Indiana bat and the northern long-eared bat by mining the Seven Hills reserve, a protection and enhancement plan (PEP) has been designed to meet certain objectives. The first objective is to minimize the taking of the bats by removing any potential roost trees during the winter months as well as assessing, surveying, and possibly closing, abandoned mine portals within the permit area. It should be noted that there are no abandoned mine portals at Seven Hills. The second objective is to provide short-term replacement of bat habitat lost during the mining operation. This can be accomplished by girdling suitable trees around the perimeter of the permit area to promote the deterioration of the bark for roosting in the summer. The third objective is restore and enhance bat habitat by planting exfoliating bark tree species as well as providing watering areas. UMC is committed to these PEP to minimize any potential take.

In response to a report finding to the USFWS, Final Report of the Range Wide Status survey of the northern copperbelly water snake *water* by Sellers in 1991, it was documented the Pigeon Creek floodplain in Warrick and Gibson counties are important habitat for the copperbelly water snake in Indiana. In response to this finding, Peabody Coal Company developed a Conservation Plan for the Pigeon Creek floodplain that would allow surface mining to occur while implementing reclamation practices intended to protect the copperbelly water snake (Peabody Coal Company 1992). The plan stipulated that a monitoring effort be implemented to track the population status of the copperbelly water snake in the Pigeon Creek floodplain. A 2002 report was published that presented findings of a 9-year monitoring effort of the copperbelly water snake in the Pigeon Creek floodplain, and included management guidelines and recommendations for future management. It is entitled, Population Status, Size Class Distribution, Reproductive Behavior, and Habitat Use of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta Conant*) in Pigeon Creek Flood Plain, Southern Indiana (1992-2000) by Michael J. Lacki, J.W. Hummer, and J.L. Fitzgerald. Results from the report show that copperbelly water snakes were more abundant post-mining than during mining or pre-mining, suggesting no lasting impact to copperbellies due to the active surface mining in the area.

As verified by state and federal agencies, there are no critical habitats known to occur within the permit area. The **Seven Hills Project** is within the range of the federally-endangered Indiana bat (*Myotis sodalis*). The forested riparian corridors present within the permit area are potential habitat for the Indiana bat and several individuals were captured during mist net surveys conducted at the proposed permit area in June 2006 during early coordination with the U.S. Fish and Wildlife Service in conjunction with the SMCRA permitting process. A second mist net survey conducted in 2007 along the northern edge of the permit boundary captured no Indiana bats at the five sampling locations.

United Minerals Company, LLC follows conservation measures to minimize the potential take of the Indiana bat by performing tree-clearing outside of the summer reproductive season and avoiding Indiana bat summer habitat to the extent possible. The appropriate season to clear trees is from October 1 to March 31. Typically, enough trees are cleared ahead of the active pit to ensure continuous mining through an area until the start of the next tree-clearing window. Large blocks of suitable summer habitat exist just outside of the project area. Additionally a buffer of between 120 and 900 feet will remain undisturbed along Pigeon Creek with the project area.

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The **Seven Hills Project** may potentially impact the summer habitat of the Indiana bat, but reclamation of these forested areas will be comparable in size to pre-mining acreages and will include species more suitable for Indiana bat nursery roosts. Species will include exfoliating bark trees such as various hickory and oak species. Moreover, riparian buffers will be planted adjacent to all the stream mitigation to provide additional habitat with access to water. The buffers will be comprised primarily of hard-masted hickory and oak species suitable for Indiana bat nursery roosts. Additionally, forested and riparian avoidance areas will be examined to determine if an adequate number of dead or potential roost trees are present. If sufficient snags are lacking, girdling of additional trees along the perimeter may be conducted to provide the suggested 1 girdled tree per 500 feet of perimeter boundary or 6 snags per acre as suggested in the *Range-wide Indiana Bat Protection and Enhancement Plan Guidelines*.

In addition to being in the range of the Indiana bat, the Indiana Natural Heritage Program mapped occurrences of the following federally and state-listed species in the vicinity of the Seven Hills Mine. This list was provided by the staff biologist at the Division of Reclamation in the SMCRA permit review. These species are mostly grassland species, but also include two obligate wetland species –copperbelly water snake and three-toed amphiuma.

Copperbelly water snake (*Nerodia erythrogaster neglecta*)
Northern harrier (*Circus cyaneus*)
Red-shouldered Hawk (*Buteo lineatus*)
Three-toed amphiuma (*Amphiuma tridactylum*)
Cerulean warbler (*Dendroica cerulean*)

This area is not designated as critical habitat to any listed species, but the northern harrier is a grassland species and has been known to thrive on mined land.

The Indiana Department of Natural Resources has routinely sighted all of the above referenced species on mined sites except the Cerulean warbler which is primarily a forest species. The IDNR has concluded that the above listed species are capable of surviving surface coal mining conditions and demonstrated the ability to re-colonize during reclamation activities.

With the area northeast of the **Seven Hills Project** being heavily mined both prior to 1977 and post 1977, there is a wide range of habitats. Prior to 1977, there are the numerous spoil piles and pit lakes in the Warrick County area and post 1977, there are large expanses of grasslands at adjacent reclamation sites. This mix of habitat provides opportunities for both species enrichment and expansion of important habitats.

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Air Quality

The temporary effects to air quality at surface coal mines are mainly due to the fugitive emissions of particulate matter. The major operations producing dust are drilling, blasting, hauling, loading, transporting, and crushing. Basically, dust sources in mines can be categorized as primary sources, actions that generate dust and secondary sources, actions that disperse the dust and carry it from place to place. Effects from dust are not allowed to pass beyond the facility or property line.

The **Seven Hills Project** will be regulated by the Indiana Department of Environmental Management Office of Air Quality. The Office of Air Quality is responsible for administering the Clean Air Act permitting, compliance and enforcement programs. There are very stringent procedures for obtaining the proper air permit and the Seven Hills Mine is pursuing qualification with the Indiana Source Specific Operating Agreement (SSOA). This permitting agreement requires that measures be taken to minimize the effects to air quality.

Cultural Resources

The cultural resources for the permit area is pending clearance by the IDNR. The Indiana Surface Mining Control and Reclamation Act (SMCRA) requires that any archaeology and historical issues be cleared by the IDNR in consultation with the Indiana State Historic Preservation Officer.

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Social

The social impacts from the **Seven Hills Project** are expected to be very positive. Warrick County has a rich heritage of coal mining. The earliest recorded mine (1818) was mentioned by Will Fortune in his history of Warrick County. However, coal mining as an industry began in 1850 with the construction of the Phelp's Coal Bank. The nearby communities of Chandler, south of the **Seven Hills Project**, and Boonville, southeast of the project, are surrounded by mining, both pre- and post-SMCRA.

The operational workforce of the Seven Hills Mine is estimated to be approximately 74 skilled workers. Existing skilled workers that transfer from other mines might impact the local demographic and population by choosing to take up residence in the local area and more importantly relocate with their families. It is likely that workers who are single or have young families would be more inclined to move. It is unlikely that any significant change in the overall age structure of the local resident population.

It is anticipated that skilled workers that first move to the area may seek short-term accommodations through apartments or rental houses. Those that choose to reside more permanently in the local community may choose to purchase an existing house or build a new house. This may promote development of new subdivisions in the neighboring communities and/or growth in the housing construction and support. Support may include the extension of utilities, installation of septic systems where no sanitary sewer access is available and home improvement services.

Economic

The economic impact of the **Seven Hills Project** on the local and regional area is expected to be very positive and come from three main sources:

- spending in local businesses by employees and their families;
- spending by the United Minerals Company, LLC on goods and services with local businesses; and
- local property taxes

As production reaches its maximum, up to 220 high-paying direct and indirect jobs with annual payrolls exceeding over \$20 million will be facilitated by the **Seven Hills Project**. Many private landowners and the local and state economies will receive significant income from the mining operation in the form of royalty payments and/or acquisition proceeds and taxes.

- The company will employ 80 people in Warrick County. Additional employment generated by other businesses as a result of the mine's impact on the local economy is highly likely.
- Estimates suggest that United Minerals will pay up to \$35,000 in income tax revenue and ~\$170,000 in property tax revenue to Warrick County on an annual basis.

In terms of cumulative economic impacts, the **Seven Hills Project** will contribute to the basic electricity production in Indiana and surrounding states. A study prepared for the Center for Coal Technology Research Energy Center at Discovery Park (Purdue University) entitled *Estimating the State and Regional Benefits of the Mining and Use of Illinois Basin Coals* estimated the economic impact that coal has on the individual states of Illinois, Indiana, and Kentucky in the Illinois Basin for the year 2007 using RIMS II multipliers.³³ In 2007, Indiana mined 34.8 million tons of coal which generated 95% of the state's electricity. Of this amount:

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- 2.95 million tons were exported out of the state at an average price of \$28.79/ton for a total export value of \$84.8 million. By applying the Indiana coal mining multiplier, the total amount of economic activity arising from the mining of this coal was \$166 million.
- 2.0 million tons were used by Indiana industry either to generate or co-generate electricity. The total estimated economic activity from mining this coal was \$347 million.
- 29.4 million tons were converted into electricity in Indiana, resulting in the generation of an estimated 70 billion kWh with sales of \$4,541 million. The estimated economic activity from mining this coal was \$6,766 million.
- The total estimated amount of economic activity arising from these three uses of Indiana coal for Indiana is approximately \$7,279 million, or 3 percent of Indiana Gross State Product.³³

Ecological Impact

The **Seven Hills Project** will impact ecosystem values and functions through the following stressor processes: alteration of topography, vegetation removal, erosion, sedimentation, and soil compaction, noise and visual disturbance, potential introduction of exotic species, and direct mortality from road kills, etc. All of these impacts are primarily temporary in nature, with many ceasing after mining and related operations have ceased and the compensatory mitigation has been implemented. The clearing of vegetation (trees, shrubs, grasses) and accompanying mining operations (that alter the original topography and soil profile) are the principle changes. The area will be regraded to approximate original contours and natural vegetation will be planted. Reclaiming a surface mine by replacing vegetation and restoring the landscape to its original contours helps minimize any permanent disruption. Surface mining and the associated land impacts are regulated under the federal Surface Mining Control and Reclamation Act (SMCRA). It has the primary purpose to ensure that surface coal mining operations are conducted in a manner that protects the environment and communities where coal is being mined; to ensure that adequate procedures are undertaken to reclaim surface areas as quickly as possible, and to strike a balance between protection of the environment and agricultural productivity and America's need for coal as an essential energy source.

Environmental Justice

The **Seven Hills Project** will not raise environmental justice concerns which are defined as the actual or potential lack of fair treatment or meaningful involvement of minority, low-income, or indigenous populations or tribes in developing, implementing, or enforcing environmental laws, regulations, and policies. Based on data sets produced by the United States Census Bureau³⁹ comparing country, state, and county facts, the following table shows the percentages of population that may be impacted by the proposed mine.

Population Facts	United States	Indiana	Warrick County
	(percent)	(percent)	(percent)
White alone, not Hispanic or Latino, 2012	63.0	81.0	93.9
Persons below poverty level, 2008-2012	14.9	14.7	9.4
American Indian and Alaska Native along, 2012(a)	1.2	0.4	0.2
Persons under 5 years, 2012	6.4	6.5	6.1
Persons under 18 years, 2012	23.5	24.3	25.0

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Persons 65 years and over, 2012	13.7	13.6	14.8
Female persons, 2012	50.8	50.8	50.7

(a) Includes person reporting only one race

Warrick County is clearly below the state and country percentages for minority, low-income, and indigenous populations as well as children under the age of five and females. The population of Warrick County in 2013 was determined to be 61,049 by the United States Census Bureau. Overall, Warrick County exceeds the state and country percentages for persons under the age of 18 and 65 years and older. The younger persons typically live at home and are concentrated in the population centers of the county that include Newburgh, Boonville, Lynnville, and Chandler which are all greater than 4.0 miles from the project site. The slight increase of older persons age 65 years and older may be contributed to the first-rate healthcare facilities located within the county such as Deaconess Gateway Hospital and St. Mary's Hospital along with numerous primary care physicians and specialists to provide healthcare support.

Warrick County has a thriving business community that has drawn in a diverse group of companies such as healthcare, food service, warehouse and distribution and offers affordable cost of living. Due to the location of Warrick County with its southern border being the Ohio River, many factories including the Alcoa Warrick Operations and SIGECO F.B. Culley Generating Station are located in Warrick County. These facilities are also considered major dischargers in terms of the National Pollutant Discharge and Elimination System (NPDES) definition. The northern part of the county is known for production of corn, soybeans, and wheat.

The **Seven Hills Project** would have no impact on the population dynamics, but it may contribute to the employment dynamics. From March 2015 employment statistics from the U.S. government, the unemployment rate for the United States was 5.5%, the state of Indiana was 5.9%, and the Warrick County was 4.9%. This clearly shows that more people to find employment and raise their economic status to above the poverty level in Warrick County which is indicated by the above statistic of 9.4% of the population is below the poverty level in Warrick County compared the state and country average of 14.7% and 14.9%, respectively. The Seven Hills Mine will employ 77 workers. For every direct mining job, there are 2.2 indirect jobs supported⁴⁰. A loss of 77 direct jobs would impact 170 indirect jobs with many being based in Warrick County. If all of the workers both direct and indirect were to become unemployed and considered Warrick County residents, the April 2014 unemployment rate would be raised to 5.3%.

Incorporated into the Public Notice Comment Response letter dated January 9, 2017 is the following response that utilized census tract-level data as recommended by the USEPA in their April 14, 2016 Overall Project Comments.

Using the publicly-available EPA's Environmental Justice Screening and Mapping Tool (Version 2016) (<https://www.epa.gov/ejscreen>) as accessed on July 29, 2016i, the Seven Hills Project is located in three census block groups: 181730302003, 181730302004, and 1817303002. Provided below are the standard reports based on the census block groups. On the exhibit map, an outline of the Seven Hills Mine permit boundary is shown in red. It should be noted that when looking as small geographic regions, such as Census block groups, that the screening tools have substantial uncertainty in their demographic and environmental data.

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EJSCREEN Report (Version 2016)

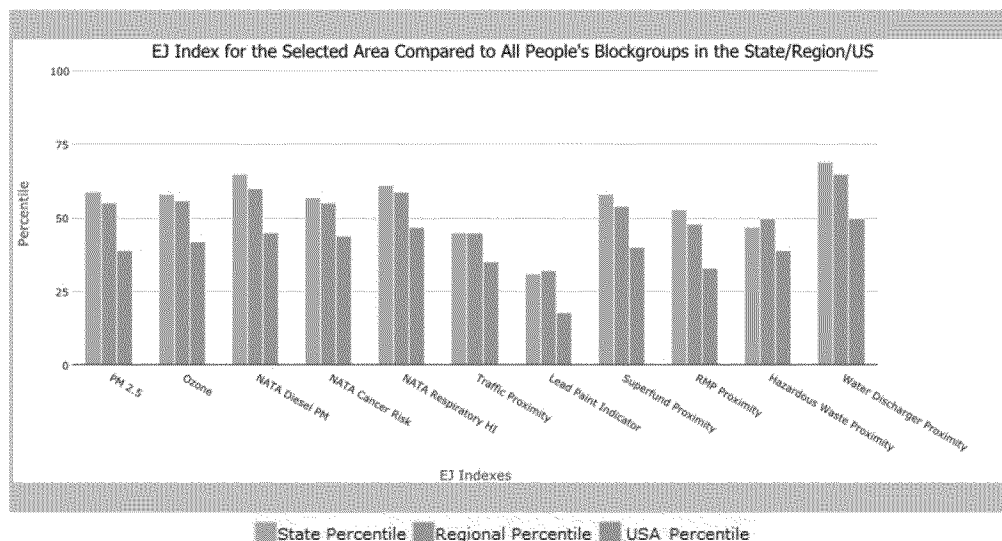


Blockgroup: 181730302003, INDIANA, EPA Region 5

Approximate Population: 461

Input Area (sq. miles): 23.22

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	59	55	39
EJ Index for Ozone	58	56	42
EJ Index for NATA* Diesel PM	65	60	45
EJ Index for NATA* Air Toxics Cancer Risk	57	55	44
EJ Index for NATA* Respiratory Hazard Index	61	59	47
EJ Index for Traffic Proximity and Volume	45	45	35
EJ Index for Lead Paint Indicator	31	32	18
EJ Index for Superfund Proximity	58	54	40
EJ Index for RMP Proximity	53	48	33
EJ Index for Hazardous Waste Proximity	47	50	39
EJ Index for Water Discharger Proximity	69	65	50



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

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Blockgroup: 181730302003, INDIANA, EPA Region 5

Approximate Population: 461

Input Area (sq. miles): 23.22



Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	10.9	11	42	10.6	58	9.32	84
Ozone (ppb)	52	51.2	67	50.3	74	47.4	75
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.393	0.835	14	0.931	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	33	34	46	34	<50th	40	<50th
NATA* Respiratory Hazard Index	0.99	1.4	26	1.7	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	46	250	43	370	42	590	39
Lead Paint Indicator (% Pre-1960 Housing)	0.53	0.36	74	0.39	68	0.3	77
Superfund Proximity (site count/km distance)	0.039	0.16	29	0.12	32	0.13	35
RMP Proximity (facility count/km distance)	0.23	0.52	49	0.51	52	0.43	60
Hazardous Waste Proximity (facility count/km distance)	0.0071	0.044	33	0.069	26	0.072	27
Water Discharger Proximity (facility count/km distance)	0.059	0.34	4	0.31	9	0.31	12
Demographic Indicators							
Demographic Index	7%	27%	6	29%	6	36%	3
Minority Population	0%	19%	5	24%	3	37%	1
Low Income Population	15%	35%	16	33%	21	35%	20
Linguistically Isolated Population	0%	2%	63	2%	58	5%	44
Population With Less Than High School Education	12%	12%	56	11%	64	14%	54
Population Under 5 years of age	0%	6%	3	6%	3	6%	3
Population over 64 years of age	22%	14%	89	14%	87	14%	87

*The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

For additional information, see: www.epa.gov/environmentaljustice

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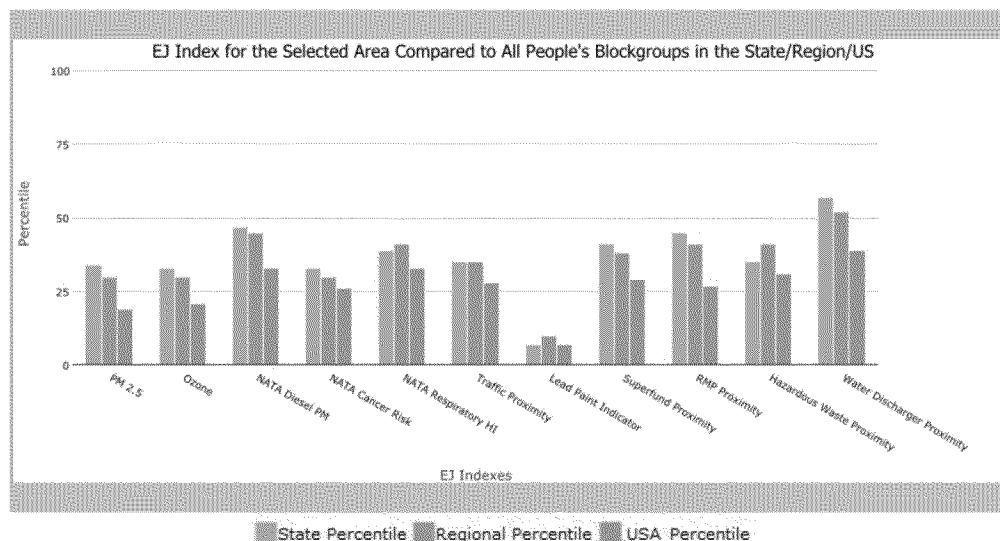


Blockgroup: 181730302004, INDIANA, EPA Region 5

Approximate Population: 1,259

Input Area (sq. miles): 4.33

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	34	30	19
EJ Index for Ozone	33	30	21
EJ Index for NATA* Diesel PM	47	45	33
EJ Index for NATA* Air Toxics Cancer Risk	33	30	26
EJ Index for NATA* Respiratory Hazard Index	39	41	33
EJ Index for Traffic Proximity and Volume	35	35	28
EJ Index for Lead Paint Indicator	7	10	7
EJ Index for Superfund Proximity	41	38	29
EJ Index for RMP Proximity	45	41	27
EJ Index for Hazardous Waste Proximity	35	41	31
EJ Index for Water Discharger Proximity	57	52	39



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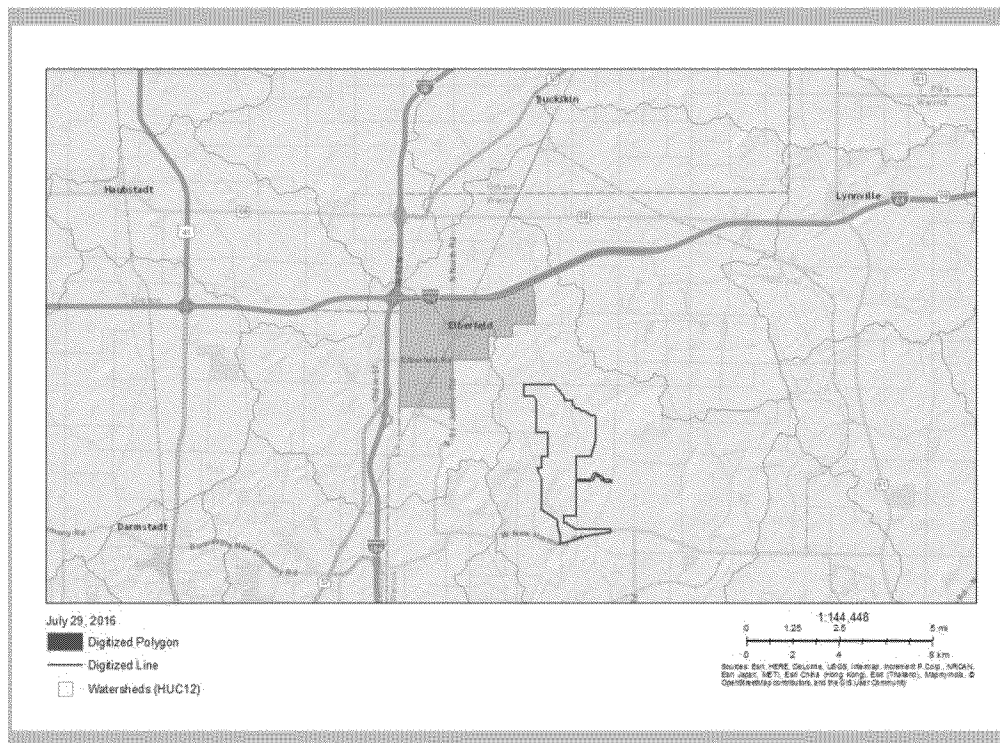


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Blockgroup: 181730302004, INDIANA, EPA Region 5

Approximate Population: 1,259

Input Area (sq. miles): 4.33



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0
National Pollutant Discharge Elimination System (NPDES)	0

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EISCREEN Report (Version 2016)

Blockgroup: 181730302004, INDIANA, EPA Region 5

Approximate Population: 1,259

Input Area (sq. miles): 4.33



Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	10.9	11	42	10.6	58	9.32	84
Ozone (ppb)	52	51.2	67	50.3	74	47.4	75
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.393	0.835	14	0.931	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	33	34	46	34	<50th	40	<50th
NATA* Respiratory Hazard Index	0.99	1.4	26	1.7	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	46	250	43	370	42	590	39
Lead Paint Indicator (% Pre-1960 Housing)	0.48	0.36	70	0.39	64	0.3	74
Superfund Proximity (site count/km distance)	0.044	0.16	32	0.12	38	0.13	39
RMP Proximity (facility count/km distance)	0.14	0.52	30	0.51	33	0.43	41
Hazardous Waste Proximity (facility count/km distance)	0.019	0.044	35	0.069	27	0.072	28
Water Discharger Proximity (facility count/km distance)	0.067	0.34	8	0.31	12	0.31	16
Demographic Indicators							
Demographic Index	13%	27%	22	29%	23	36%	14
Minority Population	0%	19%	5	24%	3	37%	1
Low Income Population	26%	35%	38	33%	44	35%	41
Linguistically Isolated Population	0%	2%	63	2%	58	5%	44
Population With Less Than High School Education	8%	12%	36	11%	44	14%	38
Population Under 5 years of age	5%	6%	33	6%	35	6%	34
Population over 64 years of age	11%	14%	40	14%	40	14%	44

*The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

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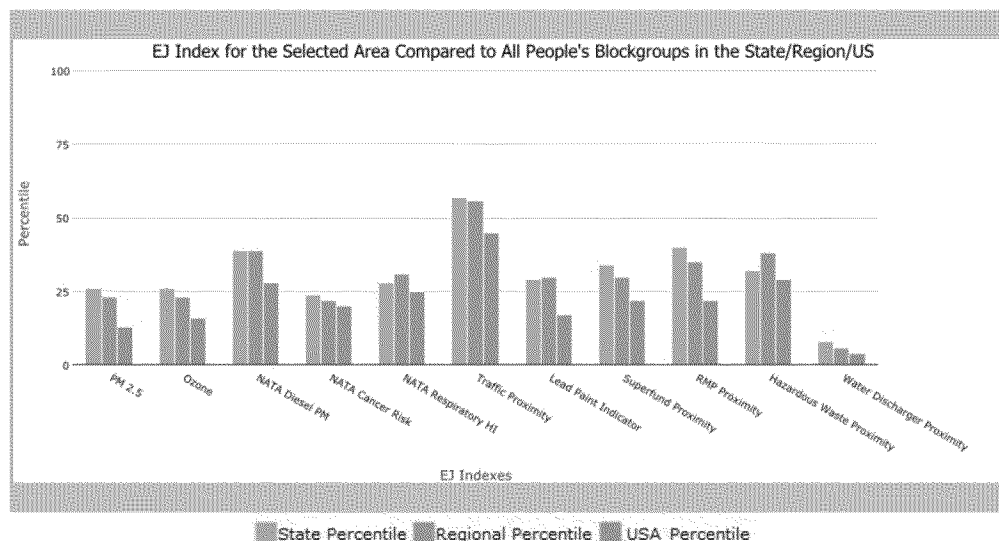


Blockgroup: 181730303002, INDIANA, EPA Region 5

Approximate Population: 1,359

Input Area (sq. miles): 27.93

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
EJ Indexes			
EJ Index for PM2.5	26	23	13
EJ Index for Ozone	26	23	16
EJ Index for NATA* Diesel PM	39	39	28
EJ Index for NATA* Air Toxics Cancer Risk	24	22	20
EJ Index for NATA* Respiratory Hazard Index	28	31	25
EJ Index for Traffic Proximity and Volume	57	56	45
EJ Index for Lead Paint Indicator	29	30	17
EJ Index for Superfund Proximity	34	30	22
EJ Index for RMP Proximity	40	35	22
EJ Index for Hazardous Waste Proximity	32	38	29
EJ Index for Water Discharger Proximity	8	6	4



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Blockgroup: 181730303002, INDIANA, EPA Region 5

Approximate Population: 1,359

Input Area (sq. miles): 27.93



Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Environmental Indicators							
Particulate Matter (PM 2.5 in $\mu\text{g}/\text{m}^3$)	11	11	58	10.6	63	9.32	86
Ozone (ppb)	52.5	51.2	78	50.3	78	47.4	77
NATA* Diesel PM ($\mu\text{g}/\text{m}^3$)	0.425	0.835	20	0.931	<50th	0.937	<50th
NATA* Cancer Risk (lifetime risk per million)	34	34	58	34	50-60th	40	<50th
NATA* Respiratory Hazard Index	1.2	1.4	39	1.7	<50th	1.8	<50th
Traffic Proximity and Volume (daily traffic count/distance to road)	5.8	250	14	370	13	590	12
Lead Paint Indicator (% Pre-1960 Housing)	0.21	0.36	41	0.39	36	0.3	52
Superfund Proximity (site count/km distance)	0.055	0.16	39	0.12	47	0.13	46
RMP Proximity (facility count/km distance)	0.15	0.52	33	0.51	35	0.43	43
Hazardous Waste Proximity (facility count/km distance)	0.019	0.044	35	0.069	27	0.072	28
Water Discharger Proximity (facility count/km distance)	0.65	0.34	88	0.31	87	0.31	88
Demographic Indicators							
Demographic Index	10%	27%	13	29%	14	36%	8
Minority Population	0%	19%	5	24%	3	37%	1
Low Income Population	21%	35%	27	33%	33	35%	31
Linguistically Isolated Population	0%	2%	63	2%	58	5%	44
Population With Less Than High School Education	7%	12%	34	11%	41	14%	35
Population Under 5 years of age	7%	6%	56	6%	60	6%	57
Population over 64 years of age	9%	14%	24	14%	25	14%	29

*The National-Scale Air Toxics Assessment (NATA) is EPA's ongoing, comprehensive evaluation of air toxics in the United States. EPA developed the NATA to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that NATA provides broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the NATA analysis can be found at: <https://www.epa.gov/national-air-toxics-assessment>.

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In general review of the EJ Indexes, a high percentile means the value is relatively uncommon. Locations at least at the 80th percentile and above will be color coded to call attention to certain locations as a very simple way to communicate relative screening results. A high percentile is not necessarily a real concern from a health or legal perspective, but it acknowledges that more research is warranted. In evaluation of the three Census tract reports for the Seven Hills Project, there are no EJ index that exceeds the pre-determined, specific reference percentile (e.g., 80th percentile).

Section 9: Contingency Plan

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In regards to the USEPA comments on the project having disproportionately high and adverse impacts to children under 5 years of age is cannot be replicated. The demographic indicator for each Census block ranges from 0 to 7% with the State, USEPA Region, and US averaging 6%.

Secondary Impacts to Hydrologic Sources

While UMC has only proposed compensatory mitigation for direct impacts to streams and wetlands, the increased mitigation ratios provide coverage for any temporary impacts experienced by adjacent wetlands and streams.

Additionally, in the big picture detailed analysis of the site and restoration plan using NESA methods demonstrates a significant environmental lift for the long term. Environmental services produced by the habitats that are present will double at 50 years and nearly triple in perpetuity based on the planned onsite reclamation. This does not include any proposed offsite reclamation. NESA analysis is currently used on an ongoing basis by Department of Interior (DOI) Fish and Wildlife and the States. The use of NESA analysis has successfully been accepted as adequate and satisfactory in a number of court challenges. The analysis quantifies the issue of impacts and is offered as a response to the comments of concern. See the attached NESA report.

In regards to the types of secondary impacts that may result from the direct impact of mining through wetlands and streams, a process in which stream channels and wetlands are excavated in order to recover coal resources that lie directly beneath and adjacent to them, and then are backfilled, regraded to their approximate original contour, and the affected channels restored, the following analysis is being provided. Secondary impacts refer to indirect effects from project activities on the remaining wetlands in the project area and contiguous to the permit area. The USEPA requested that the following impacts be reviewed for the Seven Hills Mine:

- ☐ Evaluate reduction of surface water sources in regards to the wetlands and streams within the avoidance area buffer on the west bank of Pigeon Creek.

Wetlands and streams in the buffer and avoidance area will experience temporary reduced surface water runoff after the construction of the phased sediment basins/levees along the edge of the avoidance area which are required to keep the Pigeon Creek floodwaters from encroaching into the active mining areas. These levees will be constructed in phases as the mining progresses. Overland flow diversions will be constructed to divert as much unaffected drainage around the levees as possible. These diversions will maintain a surface water source through the avoided wetlands and streams. Any affected area drainage will be routed through sediment basins. Flood events on Pigeon Creek will provide a supply of water to wetlands and stream segments within the avoidance area buffer. Significant secondary impacts to surface water sources are not expected with this project due to the temporary nature of the phased sediment basins/levees and routing of unaffected drainage around the levees. Some minor dewatering may occur in areas nearest the mine excavation but the effects and aerial extent will be quite limited due to the low permeability documented by the slug tests. Post reclamation the area will be returned to a condition similar to pre-mine.

- ☐ Evaluate reduction of surface water sources for the wetlands that will be bisected by the haul road and conveyor system that crosses Pigeon Creek.

The referenced haul road and conveyor system have been eliminated from the permit area.

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If the referenced haul road and conveyor system had been constructed as originally planned, they would have not resulted in significant secondary impacts to the wetlands as a result of reduced water sources. The conveyor system would have been an elevated system utilizing piers to span the wetlands. Although the pier footprint for the conveyor is quite small, UMC the included the entire 200 foot width of the corridor as part of the direct impact. The haul road and bridge would have had minimal impact due to the requirement to maintain floodway capacity. The haul road would have been required to be constructed at grade to avoid the impedance of flood flows.

- ☐ Evaluate the reduction in flood source of wetlands and streams on the west bank of Pigeon Creek.

Wetlands beyond the buffer and avoidance area in the permit will be mined through and replaced in reclamation. This is accounted for as a direct impact. The avoidance and buffer wetlands will continue to receive flood waters from Pigeon Creek. Surface runoff to these areas is addressed above in issue 1.

- ☐ Evaluate the reduction in flood source on Pigeon Creek baseflow.

The flood source is not removed from Pigeon Creek as a result of mining. There will be a minor redistribution of flood waters along segments of the mine permit on a spatial basis however the flood source waters emanating from Pigeon Creek will still be present and baseflow should not be significantly affected. Additionally, the length of the disturbed area along Pigeon Creek is negligible relative to the total length of Pigeon Creek and the low permeability of the lithology will buffer any temporary changes.

- ☐ Evaluate the reduction in flood source on wetlands and streams that extend offsite to the west of the proposed project.

Secondary impacts to the streams and wetlands that extend off-site to the west of the proposed project is not expected in regards to a reduced flood source as the wetland would still receive floodflow from surrounding uplands. All drainage at the project flows from west to east toward Pigeon Creek. The streams will maintain their hydrologic source. There is only one area where a portion of the wetland complex may extend across the western permit edge based on the relative floodplain elevation of 393 MSL which approximates the upland/wetland boundary. This area would receive limited overbank flooding from Pigeon Creek as this area is at its closest 0.70 mile away.

In the big picture additional secondary impacts created by mining in the Illinois Basin include the vast benefits of the major state wildlife areas and parks that are primarily previous mine sites:

- ☐ Patoka National Wildlife Refuge in Oakland City, Indiana (6,600 acres)
- ☐ Sugar Ridge Fish and Wildlife Area in Winslow, Indiana (8,100 acres)
- ☐ Greene-Sullivan State Forest near Linton, Indiana (9,000 acres)
- ☐ Peabody River King Fish and Wildlife Area in New Athens, Illinois (2,220 acres)
- ☐ Minnehaha Fish and Wildlife Area near Dugger, Indiana (3,500 acres)
- ☐ Bluegrass Fish and Wildlife Area near Elberfeld, Indiana (2,532 acres)
- ☐ Pyramid State Park near Pickneyville, Illinois (19,701 acres)
- ☐ Peabody Wildlife Management Area near Madisonville, Kentucky (45,732 acres)

If not for mining, these areas would currently have an agricultural land use and both the wildlife and those that enjoy it would be much worse off. Some of these areas are praised and frequented by the National Audubon Society for the bird populations and migration events as a result of the grasslands habitats that don't exist elsewhere. Many of the wildlife areas were mined pre-SMCRA without federal regulations

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and yet are now considered pristine wildlife refuges. Nature is quite resilient and the implications by many that mining results in permanent devastation is not borne out by these examples.

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Analysis of Indirect Effects on Adjacent Wetlands Resulting from Open Mine Pit on the Water Table

When mining is conducted below the water table groundwater flow in the immediate area will be directed towards the excavation. In order to evaluate the potential effects of the Seven Hills mining excavation on the water table and adjacent wetlands a seepage analysis is conducted using analytic methods commonly used to evaluate groundwater flow or seepage towards open mine pits. The groundwater inflow to the mine void will be dependent on the local hydrogeologic conditions, particularly the hydraulic conductivity of the geologic units.

Hydrogeology

Soils:

The major soil in the area of interest is the Bonnie silt loam. Soil types are generally reflective of the unconsolidated and bedrock geology. The Bonnie silt loam is characterized in the Soil Survey of Warrick County (U.S.D.A., 1979) as exhibiting low permeability. If there were major sand and gravel deposits present at the site you would expect coarser grained soils.

Unconsolidated materials:

Unconsolidated materials beneath the soil upper horizons above the bedrock interface have not been well characterized in site borings. Most boring logs only report a thickness of "unconsolidated" however the borings with detail specify clay. A slug test performed on the unconsolidated section in the area found a horizontal hydraulic conductivity of 6.4×10^{-5} cm/sec. Typically, vertical hydraulic conductivities are an order of magnitude less, further slowing the drainage of the unit. These hydraulic conductivity values indicate finer grained materials such as fine silt or clay as indicated by soils and field observation. The thickness unconsolidated material along the eastern edge of the proposed pit ranges from approximately 33.5 - 34.8 ft (mean: 34.3 ft)(see borings A-8, A12, A-14, and A-20 within SMCRA Permit S-00357). These borings were drilled within the Pigeon Creek remnant paleochannel and the thickness of the unconsolidated material should be considered representative of the thickness within the avoidance area.

Bedrock:

The bedrock in this area consists primarily of low permeability shale with lessor components of sandstone, limestone and coal. A slug test conducted on a bedrock well within the subject area indicated a hydraulic conductivity of 3.5×10^{-7} cm/sec. Hydraulic conductivity on the order of 1×10^{-7} cm/sec is the value required for landfill liners to be protective of groundwater. A range from 1×10^{-6} to 1×10^{-8} cm/sec is typical for southern Indiana bedrock. Again, the vertical conductivity would likely be an order of magnitude less.

Methods

Seepage Calculations:

Groundwater inflow or seepage into an open mine pit is commonly calculated in the mining industry using analytic solutions (Vandarsluis et al., 1995). Two analytic solutions that are applied to flow within the unconsolidated zone are the Dupuit and the Dupuit-Foreheimer equations.

The Dupuit equation is used to calculate groundwater flow per unit width from an unconfined water table towards a seepage face (see Figure 1). Groundwater flow per unit width is calculated as follows:

$$q = \frac{K}{L} (h_1^2 - h_2^2) \quad (1)$$

Where:

q = flow per unit width (m^2/d)

K = hydraulic conductivity (m/d)

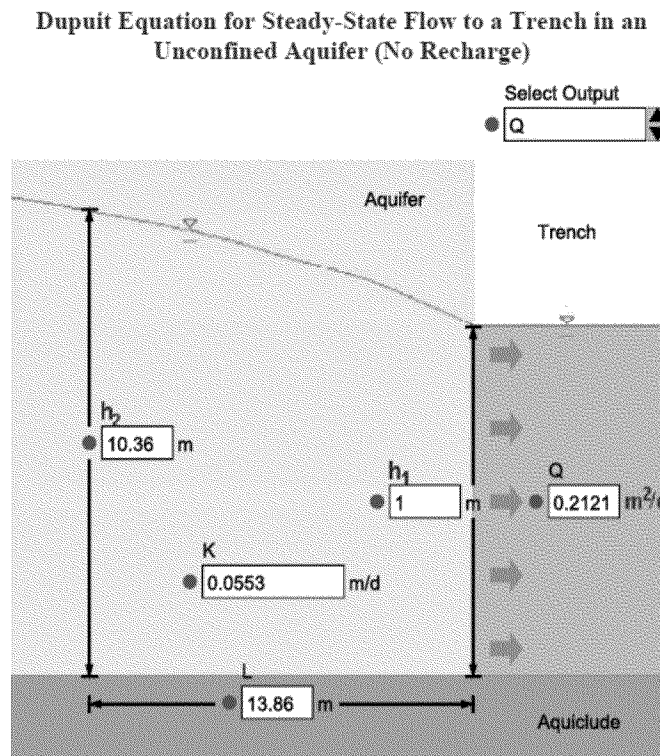
h_1 = head measured at the seepage face (m)

h_2 = head measured at the radius of influence (m)

L = distance between head measurements (m)

This equation assumes that aquifer is unconfined, isotropic, and of uniform thickness. The equation is dependent on the distance between the head measurements which can be estimated using the radius of influence calculations discussed later in this document. The flow per unit width can then be multiplied by the length of the open pit if evaluating one side of the mine excavation or the entire perimeter to estimate the total seepage into the mine void.

Figure 1. Example of unconfined flow to a seepage face. This figure was borrowed from the Dupuit Equation Calculator tool developed by Robertson GeoConsultants, Inc available at www.edumine.com.



[http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-to-a-trench-in-an-unconfined-aquifer-no-recharge-/](http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-to-a-trench-in-an-unconfined-aquifer-no-recharge/)

Alternatively seepage into a mine excavation from an unconfined water table can be predicted using the Dupuit-Forcheimer equation. This method treats the mine void in the same manner as

a group of wells that surround the periphery of the pit. The wells are then approached as a single large equivalent well which receives radial groundwater flow. In this scenario the groundwater is converging towards the open mine pit (or equivalent well) from a distant source (see Figure 2). The Dupuit-Forcheimer equation follows:

$$Q = \frac{\pi K H (R_0^2 - R_p^2)}{R_p} \quad (2)$$

Where:

Q = discharge into an open pit (m^3/d)

K = hydraulic conductivity (m/d)

H = head measured at initial water table (m)

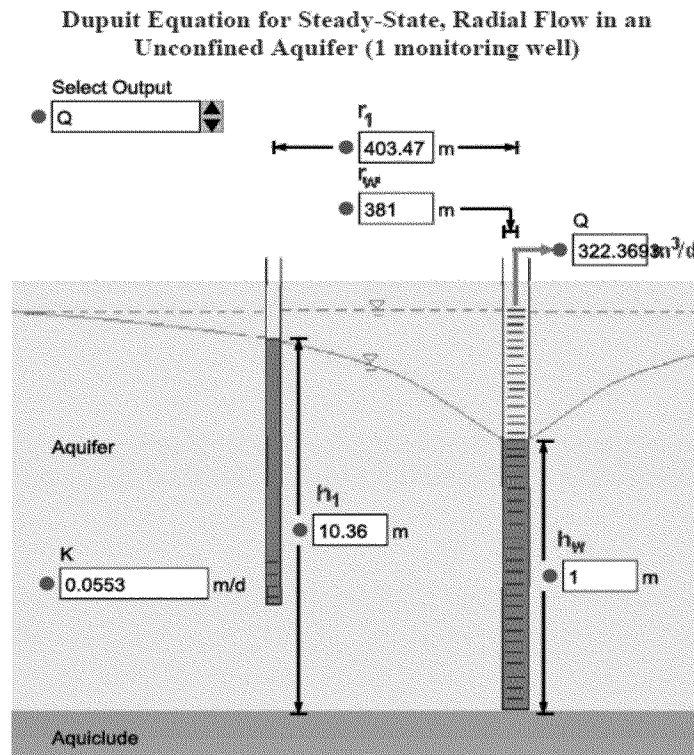
h_w = lowered water level in equivalent well or pit (m)

R_0 = radius of influence (m)

R_p = radius of equivalent well or pit (m)

This equation also assumes that aquifer is unconfined, isotropic, and of uniform thickness. The estimated seepage rate (Q) is dependent on the radius of the equivalent well or mine pit (R_p) and the radius of influence (R_0) of the mine excavation.

Figure 2. Example of Dupuit-Forcheimer equation for flow to an unconsolidated zone equivalent well or mine pit. This figure was borrowed from the Dupuit radial flow calculator tool developed by Robertson GeoConsultants, Inc available at www.edumine.com.



<http://www.edumine.com/tools/dupuit-equation-for-steady-state-flow-in-an-unconfined-aquifer-1-monitoring-well/>

To simplify the group of wells to an equivalent well (or open mine pit) the equivalent radius must be calculated. This can be estimated assuming a well of equal area:

$$R_p = \sqrt{\frac{a \cdot b}{\pi}} \quad (3)$$

Where:

R_p = radius of the equivalent well (or mine pit) m

a = width of the pit (m)

b = length of the pit (m)

Radius of Influence:

The radius of influence, or the maximum distance at which drawdown can be detected with measuring devices in the field, can be estimated using empirical equations. Two that are commonly used for mining projects are the Kusakin and Sichardt equations.

The Kusakin equation for the radius of influence is:

$$R_0 = 575 \sqrt{s} \quad (4)$$

Where:

R_0 = radius of influence (m)

s = maximal drawdown (m)

K = hydraulic conductivity (m/sec)

H = potentiometric surface prior to drawdown (m)

A more conservative estimate of the radius of influence is provided by the Sichardt equation:

$$R_0 = 3000 \sqrt{s} \quad (5)$$

Where:

R_0 = radius of influence (m)

s = maximal drawdown (m)

K = hydraulic conductivity (m/sec)

Equations 4 and 5 assume a steady-state has been reached and that the zone of influence is sufficient to supply the yield from the well (or mine void). Even if a direct source of recharge such as a pond or stream is not encountered, after some period of time the radius of influence will be expanding so slowly that it is considered to be effectively constant. This distance of influence is greater in higher permeability materials than in low permeability materials and will generally be greater for larger well drawdowns than for small drawdowns.

This seepage analysis is conducted only for the unconfined water table within the unconsolidated zone. The water table in the bedrock system is not expected to be in direct connection with the wetlands as the hydraulic conductivity of the bedrock (3.5×10^{-7} cm/sec) is nearly two orders of magnitude lower than the hydraulic conductivity of the unconsolidated material (6.4×10^{-5} cm/sec). Therefore the bedrock is considered to be an aquiclude and no flow boundary in this analysis. The thickness of unconsolidated material along the eastern edge of the proposed pit ranges from approximately 33.5 - 34.8 ft (mean: 34.3 ft)(see borings A-8, A12, A-14, and A-20 within SMCRA Permit S-00357). To simplify the analysis the thickness of the

unconsolidated zone is set at 34 ft (10.36 m). Since the avoidance area consists of wetlands that exhibit periods of surface saturation throughout the year the head of the water table prior to mining (H) and adjacent to the mine pit at the radius of influence (h_2) were conservatively set at the same thickness as the unconsolidated material in the area 10.36 m (34 ft). The height of the seepage face (h_1) and lowered water level in the equivalent well/mine pit (h_w) were established at 1 m (3.28 ft). The drawdown(s) was then calculated to be 9.36 m (30.72 ft).

Results

Radius of Influence

The radius of influence (R_0) calculated from equations 4 and 5 ranges from 13.87 m to 22.47 m (Table 1). This indicates that the drawdown adjacent to the pit should terminate within the minimum 61 meter buffer that will separate the pit from the wetlands. It is important to note that this analysis is assuming that the unconsolidated zone is completely saturated and is therefore providing a maximum radius of influence. Furthermore this analysis does not incorporate the inundated drainage ditch and sediment basin that will be built within the interior of the levee between the levee and the mine pit (see Figure 3). Runoff from the upland areas will be directed through these structures which will remain continually inundated and act as a recharge source. This should further mitigate any potential dewatering within the avoidance area associated with the mining activities.

Table 1. Calculated Radius of Influence

Method	K (cm/sec)	H (m)	s (m)	R_0 (m)
Kusakin	10.36	10.36	9.36	13.87
Sichardt	10.36	-	9.36	22.47

Notes

K: hydraulic conductivity

H: head measured at initial water table

s: maximal drawdown

Seepage into Mine Excavation

Estimates for seepage to the mine pit using the Dupuit-Foreheimer equation ranged from 322 – 517 m³/day (59 to 95 gpm) (Table 2). This is similar to the 299 to 485 m³/day (55 to 89 gpm) range estimated by multiplying the Dupuit equations discharge by the perimeter of the mine pit. The range in the seepage estimates are the result of the differences in the radius of influence calculated using equations 4 and 5. The seepage rate decreases as the radius of influence increases because the hydraulic gradient is reduced as the distance from the pit increases. The results of this analysis are based on the assumption that the unconsolidated zone is completely saturated outside of the radius of influence. It is not expected that this seepage rate will remain constant throughout the year as natural water table fluctuations will reduce the seepage rate during periods when there is not surface inundation. Therefore these estimates should be considered upper end values.

Figure 3. General cross-section from proposed mine pit through Pigeon Creek including hydraulic conductivity values of the bedrock and unconsolidated material. This segment shows the inundated diversion ditch (CDD 001C) located inside of the Flood Levee. A sediment basin will be built between the levee and open pit on the southern end of the proposed mine area.

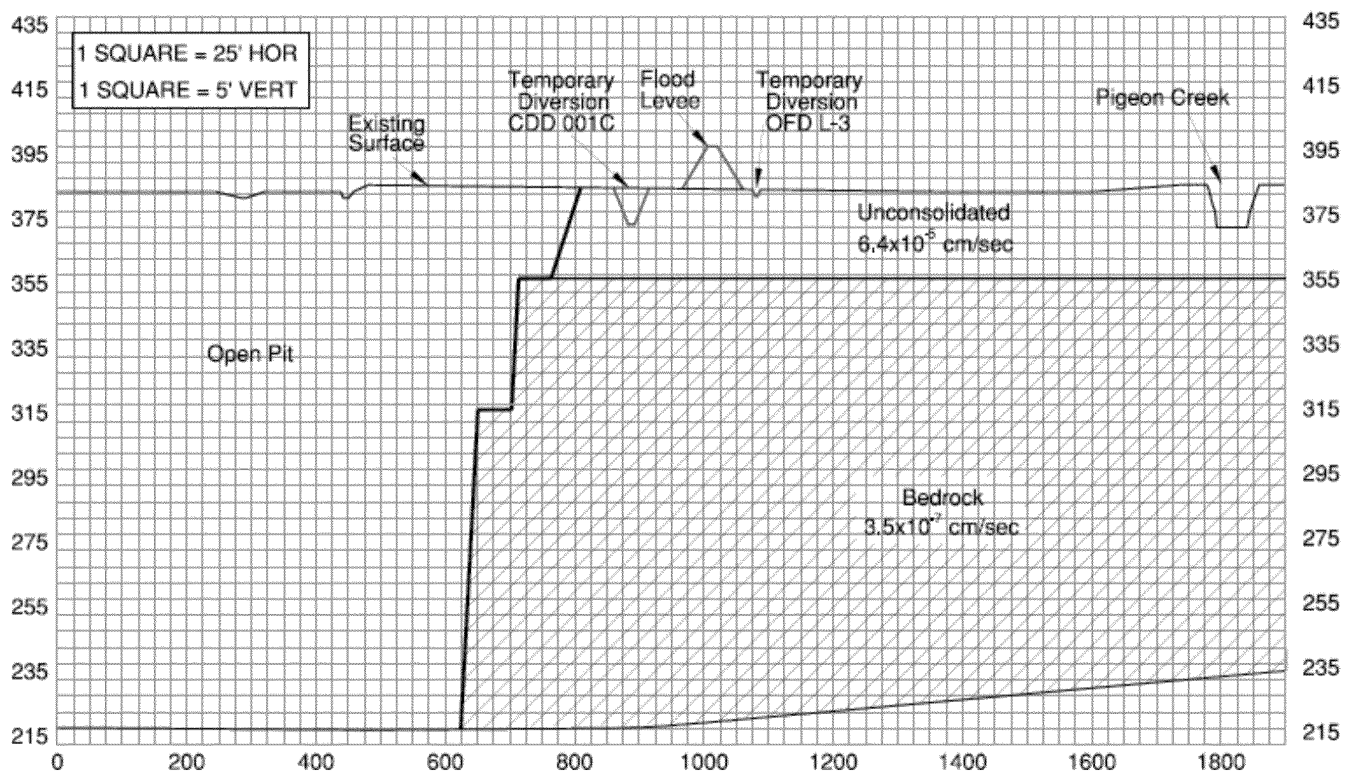


Table 2. Calculated Dewatering Volumes

Method	K (cm/sec)	H (m)	H _w (m)	h ₂ (m)	h ₁ (m)	R ₀ (m)	R _p (m)	L (m)	Q (m ³ /d)
Dupuit-Forecheimer	6.40E-05	10.36	1	-	-	394.87	381	-	517
		10.36	1	-	-	403.47	381	-	322
Dupuit	6.40E-05	-	-	10.36	1	-	-	13.87	485*
		-	-	10.36	1	-	-	22.47	299*

Notes

K: hydraulic conductivity

H: Head measured at initial water table

H_w: Hydraulic head in mine pith₂: head measured at radius of influenceh₁: head measured at seepage faceR₀: radius of influenceR_p: radius of mine pit

L: distance between head measurements

Q: seepage into mine void

* Dupuit discharge multiplied by the 2286 m mine pit perimeter

Conclusion

Results of the seepage analysis indicate that seepage into the pit from the unconsolidated zone will be less than 100 gpm and that the drawdown adjacent to the pit (radius of influence: 13.87 to 22.47 m) should terminate within the minimum 61 meter buffer that separates the pit from the wetland area. These results are in line with Peabody's past long term experience of no significant offsite effects from open pit dewatering in areas of Southern Indiana where the geology has low permeability. While it is possible that offsite impacts could occur in areas where blanket sands are present we have clear empirical evidence of no offsite issues at multiple sites with low permeable geology including the Seven Hills area (east of Pigeon Creek), Francisco, and Columbia (Snakey Point in Patoka Fish and Wildlife Refuge) where we mined within 100-150 feet of important wetlands having borders of 8000 feet plus. All three of these sites (Francisco, Columbia and Seven Hills) have silt loam soils comprised of fine grained materials with low permeability overlying low permeability bedrock. In fact, Columbia has the exact same soil type as Seven Hills. We are not aware of this type of offsite impact being noted by DNR, OSM, landowners, IDEM, EPA or the ACOE in the past. Further, DNR (with oversight from OSM) inspects mines continually for damage beyond the mining disturbance. This is a major component of SMCRA and offsite damage is detailed for Indiana in an annual OSM report. The fact that this report is specific to offsite damage further demonstrates that mines are being reviewed.

Based on the above facts and considerations we do not believe there will be significant impacts offsite resulting from the open pit effect on the water table or interaction with the stream/wetland. However, to provide assurance, we will include an adaptive management plan to address any unanticipated offsite impacts. Potential mitigation includes but is not limited to compaction of existing materials, addition of clay and placement of cut off walls.

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UNITED MINERALS COMPANY, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
U.S. Army Corps of Engineers Project No. LRL-2013-635-gjd
Additional Information Request

Dear Ms. Devine:

On behalf of **United Minerals Company, LLC (UMC)**, provided are responses to the list of needed information submitted by Ms. Lee Anne Devine via electronic mail on August 3, 2017 following a meeting in Louisville, Kentucky on August 2, 2017. UMC has reviewed the previously proposed mining area to evaluate if additional avoidance of the wetlands area was possible. This review was deemed necessary in order to move the permit process forward. The new mining plan will allow us to continue operations although this will significantly reduce the mining area. As a result of this review the wetland impacts have been reduced by approximately 144 acres on the west side of Pigeon Creek. Please see the table below that depicts the modifications based on the new mining plan as well as the attached map entitled Delineated Wetlands with Reduced Impacts Shown.

	2016 Public Notice	August 29, 2017 Mine Plan Revision	Difference
PFO Wetlands (acres)	462.18	323.08	- 139.10
PSS Wetlands (acres)	19.81	10.60	- 9.21
PEM Wetlands (acres)	27.13	13.30	- 13.83
PUB Wetlands (acres)	1.04	1.04	0
Wetland total (acres)	510.16	348.02	-162.14
Ephemeral Streams (feet)	8,427	8,241	- 186
Intermittent Streams (feet)	45,213	36,154	- 9,059

Perennial Streams (feet)	200	0	- 200
Stream total (feet)	53,840	44,395	-9,445
Open Waters total (acres)	72.85	104.45	+ 31.60
Permit Area (acres)	1,679.60	1,679.60	0
Mining Area (acres)	814.12	398.43	- 415.69
Mine Support Area (acres)	355.34	614.40	+259.06
Avoidance Area (acres)	510.14	587.77	+77.63
Unaffected Area (acres)	0	79.00	+79.00
Coal in Avoidance & Unaffected Areas (tons)	5,940,000	8,890,000	+ 2,950,000

With coordination from the engineering department and environmental department, the mining area was reduced to avoid and not impact additional wetland acreage on the west side of Pigeon Creek. Originally, the avoidance buffer along Pigeon Creek varied from a width of 900 feet at the north end of the permit, transitioned to a minimum of 120 feet in the middle, and expanded to 275 feet in the south. After further evaluation of using a minimum efficient open mining pit length of 2,200 feet and maintaining the needed area for drainage control and levee construction, an additional avoidance area has been proposed over what was included in the public notice. This new avoidance area totals 67.0 acres and contiguous to the middle and south avoidance areas which increases both the wetland acreage and buffer to Pigeon Creek from 120 feet to 800 feet in the middle and from 275 feet to a minimum of 580 feet in the south. A 77.1 acre area, that has been designated as an unaffected area where the wetland impacts have been removed, was included due to the mining pit becoming too short for efficient and safe mining. Additionally, both crossings of Pigeon Creek as shown in the public notice will be not be utilized and those acreages and aquatic resource impacts will be avoided. The avoidance areas on the east side of Pigeon Creek which were requested by the USACE to be reevaluated due to the increased areas of floodway excavation needed for the floodway model and access routes into the site have been modified and any impacts have been included in the above table. The responses below are based upon the new mining plan that significantly reduces impacts to wetlands.

In responding to the additional information request, your request will be listed first in *italics print* followed by the response from UMC in **blue bold print**.

Identifying all impacts to "waters of the U.S."

Direct Impacts

- *Noted 5/22/17 avoidance specified in email from B. West*

In the original Section 404 permit submittal, 510.1 acres was proposed to be utilized as avoidance areas for surface mining. In the email provided by Bryce West on May 22, 2017, additional avoidance area as proposed with the inclusion of the two crossings of Pigeon Creek and the increase of the wooded buffer along Pigeon Creek to maintain a minimum of 250 feet through the forested wetland are on the west side. With this request for additional information and review of the mining plan additional avoidance and unaffected areas have been incorporated and have been noted above.

- *Mentioned in previous two meetings but please clarify – prep plant – where is slurry disposal going and how will it get there:*
- *Any impacts associated with that?*

No preparation plant facility will be constructed within the Seven Hills permit boundary. All coal will be trucked overland via existing roadways both public and private to the existing preparation plant at the Wild Boar Mine that is 7.5 miles away. Slurry generated from the Wild Boar preparation plant will not be disposed within the Seven Hills permit. It will be disposed in approved areas within the Wild Boar Mine and the West 61 Mine which are adjacent to the preparation plant. The slurry disposal at Wild Boar and/or West 61 does not alter the approved Section 404 permit requirements at those sites. The current SMCRA permit for Seven Hills will be modified to reflect the removal of the preparation plant, beltline, haul road across Pigeon Creek, and associated facilities once the USACE permit changes are finalized.

- *Flood Plain Excavation – Appears to be additional impacts to “waters” not accounted for in PN*

The floodplain excavation areas and any aquatic resource impacts on the east side of Pigeon Creek associated with removing the elevated spoil areas that restrict the effective flood flow associated with the Construction in a Floodway application have been accounted for and are included in the updated direct impact quantities. Impacts will be primarily to wetland fringes along the manmade impoundments that are dominated by undesirable phragmites. Excavated material will be pushed by dozers and deposited into the open waters. The elevated spoil areas will be lowered down to a uniform elevation of 390 m.s.l. which was determined to provide effective capacity during the base flood event. In addition, the avoidance areas have been adjusted to account for any potential impacts for bringing equipment into the site. Existing paths will be utilized to bring equipment into the site from either Seven Hills Road or Wasson Road. Any disturbances for these impacts are accounted for and will be mitigated.

- *Open Water Impacts – appears to be all Jurisdictional Open Waters – 104 acres*

Based on the polygons and table from the permit narrative, the jurisdictional open waters totals 104.85 acres. There is a discrepancy with the value listed for open waters in the SMCRA pre-mine land uses which shows a total of 148.4 acres. This increased acreage includes several delineated PSS and PEM wetland areas that were denoted as open water when the flown topography was conducted. For the purposes of the Section 404 permit application, UMC will utilize the 105.95 acres as the total jurisdictional open waters delineated and 104.45 acres to be impacted. OW4 is entirely in the avoidance area and is not included as an impact. It should be noted that an isolated open water OW1 was conceded to being jurisdictional in early 2016. OW1 had a surface area of 1.10 acres. Impacts to the open waters will be the filling or partially filling of them with spoil and/or boxcut material which will decrease volume, a temporary increase in suspended solids, temporary increased flow, some shoreline vegetation disturbance, and reduced open water habitat. Two smaller open waters will be removed entirely when they are mined through. The positive impacts will be increased floodway area for the impacts, increased wetland area, additional area for hard-mast forest plantings, and additional habitat for the copperbelly water snake and other terrestrial species in the watershed.

- *Have all the impacts associated with the levee construction been determined including equipment disturbing adjacent wetlands during construction?*

Yes, all wetland impacts for the levee construction have been determined. There will be no disturbance conducted in the areas denoted as avoidance areas. All impacts for levee construction, drainage control, and coal extraction will be conducted inside the area planned for impacts.

Indirect Impacts

- *HEC-RAS Model – Only have the results of model and not the model*

The input files used in the latest HEC-RAS model are being provided. The files contain the discharge values for the 10-year and 100-year flood events, and the geometry files for the cross-sections and bridge structures. The geometry files depict the existing floodplain conditions with both the old and new Seven Hills Road bridge (the base condition) and the proposed project configuration including a single levee constructed to protect the latest revised mining area in conjunction with the excavation of spoil east of Pigeon Creek to re-establish effective flow through the area.

- *Flooding/inundating anything that is not currently impacted by existing conditions is an impact*

The Indiana Department of Natural Resources is the state agency charged with regulating construction activities in floodways under the Indiana Flood Control Act. Pursuant to this

act, the DNR issues permits for projects that: do not adversely affect the efficiency of or unduly restrict the capacity of the floodway; do not constitute an unreasonable hazard to the safety of life or property; and does not result in unreasonable detrimental effects on fish, wildlife or botanical resources. Under this program, the DNR defines the regulatory flood as the 100-year frequency flood event. In addition, the DNR's floodplain management rules define adverse impacts as an increase in the regulatory flood event of greater than 0.14 feet above the base conditions. In the absence of any other specific rules or guidelines, this criteria was used in evaluating potential impacts of the proposed project.

- *Flooding/inundating anything that is not currently impacted by existing conditions is an impact*

Potential Indirect Impacts

As discussed in the Hec-Ras report, the regulatory flood event required to be evaluated as part of the Construction in the Floodway permit application is known as the "100-year flood". Although such an event is often misconstrued as only occurring once every one hundred years, statistically it is the flood event that has a one-percent chance of occurring in any given year. Thus, by its definition, this is a very rare event and likely will not occur during the expected life of the proposed mining operation. However, if such an event did occur, there would be only insignificant indirect impacts to the aquatic resources and terrestrial habitat in the vicinity of the project, since the frequency, duration and intensity of flooding does not increase significantly. Since flooding is valley-wall to valley-wall, the areas inundated due to increased flood levels are on the steep valley side slopes that are well drained and not subject to long-term ponding or standing water, the conditions that could lead to tree mortality and associated loss of biomass. Likewise, the more frequent and less severe flood events would have even less impacts on the fish, wildlife and botanical resources of the area.

Since the 100-year flood is a very rare event and the estimated life of the mining operation is approximately eight (8) years, the HEC-RAS model was used to evaluate the potential impacts that might occur during the 10-year flood event. Such an event is more likely to occur during the life of the operation. The results of the HEC-RAS model indicate the computed flood elevations during the 10-year flood are approximately 2+ feet lower than the 100-year flood through the study reach. However, comparison of the computed water surface top widths at any given cross-section shows only a very small increase in the top width between the two flood events. This indicates that the entire floodplain from valley-wall to valley-wall is being inundated and that there is very little increase in the lateral extent of flooding during the more severe events. Likewise, the effect of the levee construction showed similar results; i.e. increases in flood depth but very little increase in the lateral

extent of flooding during the 10-year event. Thus, there would be only minor indirect impacts to the aquatic resources and terrestrial habit in the vicinity of the project.

The wetlands proposed to be avoided on the west side of Pigeon Creek between the levee and creek will continue to be inundated by overbank flooding thus maintaining the functions and values of the remnant PFO1 wetlands. The hydrology of the avoided areas is driven partly by inundation and retention of surface water from overbank flooding, upstream flow and beaver activities and not from subsurface flow connections with the wetlands further west of the creek. Since these areas will still be subjected to overbank flooding during and after the mining operations, only minor impacts are expected to the functions and values of avoided wetlands.

The proposed reestablishment of the floodplain east of the creek will allow floodwater to flow through areas presently isolated from the creek and permit the creation of wetlands with similar functions and values as the wetlands to be directly impacted by the mining operations. The partial filling of the existing open-water impoundments with spoil to reestablish flow east of the creek will retain some of the current functions while allowing the restoration of additional shallow-water and terrestrial habit in this area. The floodplain reestablishment will provide habitat areas for the migration or relocation of the aquatic and terrestrial species directly impacted by the proposed mining operations. Furthermore, the size of the directly impacted area is negligible when considering the amount of aquatic and terrestrial habitat existing in the surrounding area as well as present in the entire Pigeon Creek watershed.

Construction of the levee will result in the temporary loss of flood storage due to isolating the floodplain areas protected by the levee. However, this temporary loss is offset by the increase in storage created by reestablishing the floodplain along the east side of the creek and increases in flood storage upstream of the project resulting from backwater flooding in floodplain areas already subject to inundation. Thus, the loss of the storage due to construction of the levee will not result in a decrease in flood retention or an increase in the potential for additional flooding downstream of the project area. In addition, the minor increases in flood water depth and storage upstream of the project area results in a commensurate minor decrease in the flow velocity through the overbank areas. This reduction in flow velocity will enable more sediment deposition in the overbank areas thus improving water quality and allowing nutrient cycling.

Another consideration is the frequency and duration of overbank flooding and the potential indirect impacts this may have on the vegetative species present in the wetland areas. An analysis of the flow statistics of the USGS gage on Pigeon Creek at US Highway 41 in

Evansville, Indiana was undertaken to determine the flow duration of daily values recorded at the gage during the period of record. The watershed of Pigeon Creek at the gage is approximately 320 square miles while the drainage area at the project site is approximately 200 square miles. The flow duration information indicates the measured stream discharge values respond relatively quickly to the commencement and cessation of precipitation in the upstream watershed and long-duration flooding does not occur. The flow duration is the percentage of time that a particular flow value was exceeded during that time period. Based on this statistical analysis, the flow values corresponding to 0.5%, 1% and 2% of the time were estimated. On average during a calendar year, the 0.5% flow would be expected to be exceeded on about 1.8 days (0.005×365). Likewise, the 1% and 2% flow values would be expected on about 3.7 and 7 days per year, respectively. A Hec-Ras model was developed to compute the flood elevations through the project area corresponding to the 0.5%, 1% and 2% flow values. The computed flood profiles were compared to the elevations of the left bank and right bank at the cross-section locations along the stream. This analysis showed the 2% flow is approximately the same elevation as the stream banks and would roughly correspond to the "bank full" value. The 1% and 0.5% values are both above the bank elevations indicating overbank flooding would occur. The Hec-Ras analyses indicates that overbank flooding through the project area would be expected to occur on approximately 2 to 7 days per year. This frequency and duration of inundation would not result in any detrimental impacts on the existing vegetation nor result in loss of tree biomass. The project is not expected to result in any significant increase in the frequency, duration or intensity of flooding. The hydrology changes due to the temporary levee construction during flood events are not expected to cause any alterations in the avoided wetlands beyond what is normally seen in variations in annual precipitation amounts and events.

The proposed reestablishment of the floodplain east of the creek will allow floodwater to flow through areas presently isolated from the creek and permit the creation of wetlands with similar functions and values as the wetlands to be directly impacted by the mining operations. The partial filling of the existing open-water impoundments with spoil to reestablish flow east of the creek will retain some of the current functions while allowing the restoration of additional shallow-water and terrestrial habitat in this area. The floodplain reestablishment will provide habitat areas for the migration or relocation of the aquatic and terrestrial species directly impacted by the proposed mining operations. Furthermore, the size of the directly impacted area is negligible when considering the amount of aquatic and terrestrial habitat existing in the surrounding area as well as present in the entire Pigeon Creek watershed

- *Flood easements*

Flood easements will be obtained for properties that will be affected by increases of 0.14 feet above base conditions.

- *I-64 – is INDOT aware?*

INDOT has been contacted concerning this project. The 100 year flood event elevation increase at Interstate 64 will be kept below 0.14 feet above the base conditions. This is required by the Construction in a Floodway Permit. This is explained in more detail in the attached HEC-RAS Report.

- *Would like inundation map*

The included HEC-RAS report includes a map and discusses inundation.

- *What is being impacted by the increase in elevation – old works, other waters, terrestrial/aquatic impact?*

See the above comments and the HEC-RAS report regarding these impacts.

- *Should model be updated to reflect the recent 200-500 year event?*

The state law requires the use of a 100 year storm for the flood way permit. In the unlikely event that another storm greater than a 100 year storm occurred during the time mining operations are active the equipment and personnel would be moved out of the pit area to higher elevations until the flood water receded or it is deemed safe by a mine engineer to enter the pit area. It should be noted that the Francisco Mine levee system withstood the storm referenced above with no issues. The Seven Hills levee will be constructed using the same construction methods utilized at Francisco mine.

- *Velocity Increases*

- *Station 126+44 – 3.44 to 7.27 ft/s*
- *Sedimentation/Additional Erosion/Instability/Downstream Impacts*

See the HEC-RAS report concerning velocity increases, erosion, instability and downstream impacts.

- *Wetlands being bisected on-site by levees or other activities*

There are wetlands that were delineated which are being bisected by various activities including levee construction, drainage control, and coal extraction. The following table depicts all the wetlands that will be partially impacted. It will list the acreage that will be directly impacted by the above activities and the acreage that is not planned to be impacted.

It has been the company's long-term experience in the Illinois Basin, that mining has produced little to no effect on adjacent existing wetlands. Wetlands at the Lynnville Mine area (east of Pigeon Creek next to Seven Hills) and at the Columbia Mine (Snakey Point Marsh Complex in the Patoka River National Wildlife Refuge and Management Area) had mining conducted to within 100 feet of these wetlands along lengths of more than 8,000 feet with no off-site issues. Based on past experience and the data provided below, measurable indirect impacts are not expected to occur on the adjacent wetlands. Nevertheless, an Adaptive Management Plan (AMP) can be created to monitor the adjacent areas and provide appropriate mitigation if negative impacts occur.

Wetland ID	Mining Area Acreage				Avoidance Area Acreage			
	PFO	PSS	PEM	PUB	PFO	PSS	PEM	PUB
PEM 3			1.10				4.60	
PEM 6			5.21				2.80	
PEM 8			0.04				0.02	
PEM 15			2.21				5.26	
PFO 1	299.00				276.70			
PFO 3	1.85				19.21			
PSS 7		9.36				4.07		
PSS 14		0.16				0.16		
1RW32	4.12				0.30			
Total:	304.97	9.52	8.56		296.21	4.23	12.68	

- Draw down from 200' pit – Need scientific study – seepage analysis

Please see the included 'Analysis of Indirect Effects on Adjacent Wetlands' conducted by our internal hydrologist and consultant hydrologist with extensive experience in hydrogeology associated with mining.

- Impacts on Pigeon Creek – need cut-off wall – could "drain" Pigeon Creek
- Riverward side/west bank of levee – increased velocities and inundation
- High Point Mine – potential mining butts up to avoided areas – any impacts to avoided areas from this proposal?

There will be no potential mining impacts as a result of the High Point Mine to avoidance areas shown at the Seven Hills Mine on the east side of Pigeon Creek. All impacts associated with the High Point Mine have been reevaluated and additional avoidance has been added along the entire length of the common permit boundary. Any impacts from mining at High Point are not relevant to the Seven Hills project. At one time, a shared processing plant was planned to be constructed between the two mines to minimize costs and each project's footprint. This plan has been changed and now no processing plant will be constructed at either facility. The coal extraction areas of the two mines are not connected. In fact, the coal extraction areas are separated by 1.1 miles or 6,600 feet. Both mines will utilize the existing haul road that connects to the existing Wild Boar Mine processing facility. The only potential impact will be from an existing open water structure that will be utilized as a sediment basin for the disturbances associated with the High Point Mine. It will discharge into Open Water 6 via a swale through PEM Complex 15. The discharge from sediment basins are monitored twice monthly during mining and once quarterly during reclamation until final bond release of the contributing watershed with all discharges being subject to stringent NPDES limits. Any excursions from the limits must be documented and reported. Any potential impact to the downstream features in the Seven Hills project will be negligible due to the buffering capacity of the Open Water 6.

- *Levee construction – Corps would expect:*
 - *Keyway 6' deep entire width; 95% compaction; ASTM D 698 cohesive soils; 8" lifts; biodegradable geotextile fabric*
 - *Pipe through levee – critical issue*
 - *Height of Levee – 1 foot of freeboard*
 - *In SMCRA application – open channel spillway cutting through levee*

The USACE expects the above construction specifications on federal projects under their governance. It needs to be emphasized that the levees to be constructed for the Seven Hills Mine are temporary and completely optional if the company is willing to assume the risk of Pigeon Creek flooding into the open pit. The levees are constructed for flood protection and drainage control to comply with Indiana Construction in a Floodway and NPDES requirements. The levees also are part of the mine's ground control plan which is approved by the Mine Safety and Health Administration (MSHA). UMC is providing the levee design plans per the USACE request; however, UMC is not seeking USACE approval for design criteria. The use of levees for flood protection in the Midwest area in mining operations is a common practice. Listed below are the construction guidelines successfully utilized at the nearby Francisco Mine.

1. The levee will be constructed prior to the start of the mining operation. The levee is temporary and will be removed upon the completion of mining and reclamation.
2. Remove approximately 1 foot of topsoil and store in designated areas.
3. Excavate a keyway by excavating approximately 1 foot deeper than the topsoil for the entire width of the level. The soil from the keyway excavation will be utilized in the construction of the levee, if it is cohesive material. Compact the soil beneath the 1 foot of removed material to 92% compaction for cohesive soil materials.
4. Construct the levee by placing in 1 foot lifts and then compacting to 92% compaction for cohesive soil materials excavated from the mining area. If the material is wet, greater than 3% of the standard moisture content, place in 1 foot lifts, disc and allow to dry, prior to compaction. If the material is dry, within 3% of standard moisture, place on the levee and compact to appropriate of standard proctor amounts. If the material is extremely dry, you will need to add moisture to obtain the 92% compaction requirements.
5. The levee will be constructed with 3 H:1 V side slopes and a minimum fifteen (15) foot top width.
6. The top of the levee will be constructed to a minimum of 1 foot above the base flood elevation associated with the nearest section as found in the Construction in a Floodway results.
7. The levee will be mulched and seeded.

The company has successfully constructed levees along the Patoka River near Francisco, Indiana utilizing the same type of soils to protect the open pit at the Francisco surface mine. No failures have been observed even after the record rains in the spring of 2017.

It has been determined through statistical analysis that the 2% flow is approximately the same elevation as the top of bank in Pigeon Creek and would roughly correspond to the "bank full" value. The 1% and 0.5% values are both above the bank elevations indicating overbank flooding would occur. The HEC-RAS analyses indicates that overbank flooding through the project area would be expected to occur on approximately 2 to 7 days per year.

The SMCRA permit application is currently being updated with design changes utilizing culverts with flood gates instead of open channel spillways through the levees for

discharges from the internal sediment basins. The culverts placed within the levee will be installed utilizing standard engineering practices for compaction and seepage control.

Operations questions and concerns

- *Material disposal in lakes – how is this being done?*

To limit the projected effects of the mining activities on flood levels, hydrologic and hydraulic modeling was conducted using HEC-RAS. To avoid negative economic consequences resulting from the inundation of the active pit during mining if no protection was in place, temporary earthen levees will be constructed. Currently, spoil piles and remnant levees from previous surface mining operations rise above the Pigeon Creek floodplain. These obstructions inhibit effective flow through of floodwaters on the east side of the creek. To remove the flow restrictions, some spoil piles and levee fill will be pushed with dozers into the existing manmade impoundments adjacent to the proposed excavation areas. Water will first be lowered in the impoundments through pumping and discharging in order to create additional capacity to allow for appropriate settling site for any suspended sediment. NPDES required monitoring will be conducted during all of these activities to insure appropriate water quality is maintained. The material will be graded down to a uniform elevation 390 m.s.l. Impacts to the open waters will include decreased volume, a temporary increase in suspended solids, temporary increased flow, some vegetation will be disturbed near the impoundment boundary, and reduced open water aquatic habitat. The positive impacts will be increased floodway area, increased wetland area, additional area for hard-mast forest plantings, and additional habitat for the copperbelly water snake and other terrestrial species in the watershed. The work planned for this part of the project is above what is needed to meet the floodway requirements and this is proposed to address concerns expressed by the USFWS over past reclamation practices in this area.

- *Levee construction*

- *Are you removing the levee keyway?*

The proposed levee keyway will be removed to reestablish the subsurface connectivity to the wetlands.

- *How do you get equipment into Phase III and Phase IV?*

With the new mining plan and reevaluation of the associated HEC-RAS floodway model, only one levee is required. All mining operations will be within the one levee area not requiring the moving of equipment around any levee. Equipment could be moved on high areas adjacent to the levee if needed in other areas such as the spoil disposal area. This would involve tracking up the hill around the edge of the levee if needed. All mining

equipment can be moved inside and outside of the levee via the haulroad which will be located above the floodplain.

- *Removal levee and potential erosion from increases in velocities and destabilization as remove Phase I and II levees and then Phase III levee*

The new mining plan will not require the removal of levees in phases since only one levee will be utilized. The levee will be removed once mining, grading, stream restoration, and revegetation has been successfully completed. At that time, velocities and destabilization will be reduced as the levee can be totally removed. The reclaimed levee footprint will be revegetated as soon as possible after removal. The additional floodway areas constructed on the east side of pigeon creek pre-mining will also help reduce the velocities at the time of levee removal.

- *LEDPA – once impacts are determined – LEDPA analysis can be performed*

Once the impacts have been determined and agreed on by all parties, the LEDPA analysis will be performed.

- *Mitigation – did not spend much time reviewing proposed mitigation as we are not there yet*

The compensatory mitigation package will be more thoroughly developed and based on the final impacts that will be agreed on by all parties involved.

- *Cumulative Impacts – more thorough cumulative analysis is required for 8-digit HUC (Highland-Pigeon Creek watershed)*

See the attached Cumulative Activities attachment.

- *Biological Study – provide a robust assessment of the direct and indirect impacts to aquatic, avian, and terrestrial species that utilize the site in supporting various aspects of their life cycle. This may include, but is not necessarily limited to nursery refuge, habitat, and food web support. A more comprehensive discussion/inventory is needed on what species are present on the site, both listed species (federal and state) and not listed species, whether they are present permanently or utilize the site temporarily. How would the mining affect these communities locally and further off-site?*

UMC has employed Eco-Tech, Inc. of Louisville, Kentucky to conduct a rapid terrestrial and aquatic biological assessment within both the permit area as well as in targeted locations within the Highland-Pigeon Creek watershed which will include vegetation classification and landscape analysis, terrestrial wildlife studies, small mammal trappings, remote camera

monitoring, avian study, herpetofauna survey, as well as water quality and aquatic bioassessment. A scientific report will provide further information and analysis to address concerns regarding the biological component of the proposed project. Include in the report will be the methods, results, and discussion following the standard biological assessment report style. Tables, maps, and other exhibits will be presented as needed throughout the document. Field work for these assessments will begin August 28, 2017 with a final report to be delivered the week of September 18, 2017.

If you have any questions or comments, I can be reached at 812.922.1046 or via email at <ann_nelson@peabodyenergy.com>.

Sincerely,



Ann M. Nelson, PE
Authorized Representative

Enclosures

cc: Seven Hills Mine - Permit Binder (1x)





Harmony Rd

2+10
9'6' 1/8"

#8, #9'06'
9'6' #085

5'8'0' *+ 5' 2'4/+6

#8, #9'06'
9'6' #085

#8, #9'06'
9'6' #086

008+
#4+ #6
/10



4+ → 9+
2#61-# 4+8'4 %*#00'

)+\$510 L %4706;
2+- L %4706;

#2241 +/- #6 12'0 2'6 6'065

)+\$510 L %4706;
2+- L %4706;

9'4.7/\$+# 1'0'
#44# 8#6

Old Lake





Seven Hills Mine – LRL-2013-635-gjd

Specific Indirect Impacts to Waters of the U.S.

The following table depicts the waters of the U.S. that will be either bisected by mining impacts or avoided in its entirety and a listing of the potential indirect impacts that may occur to those features.

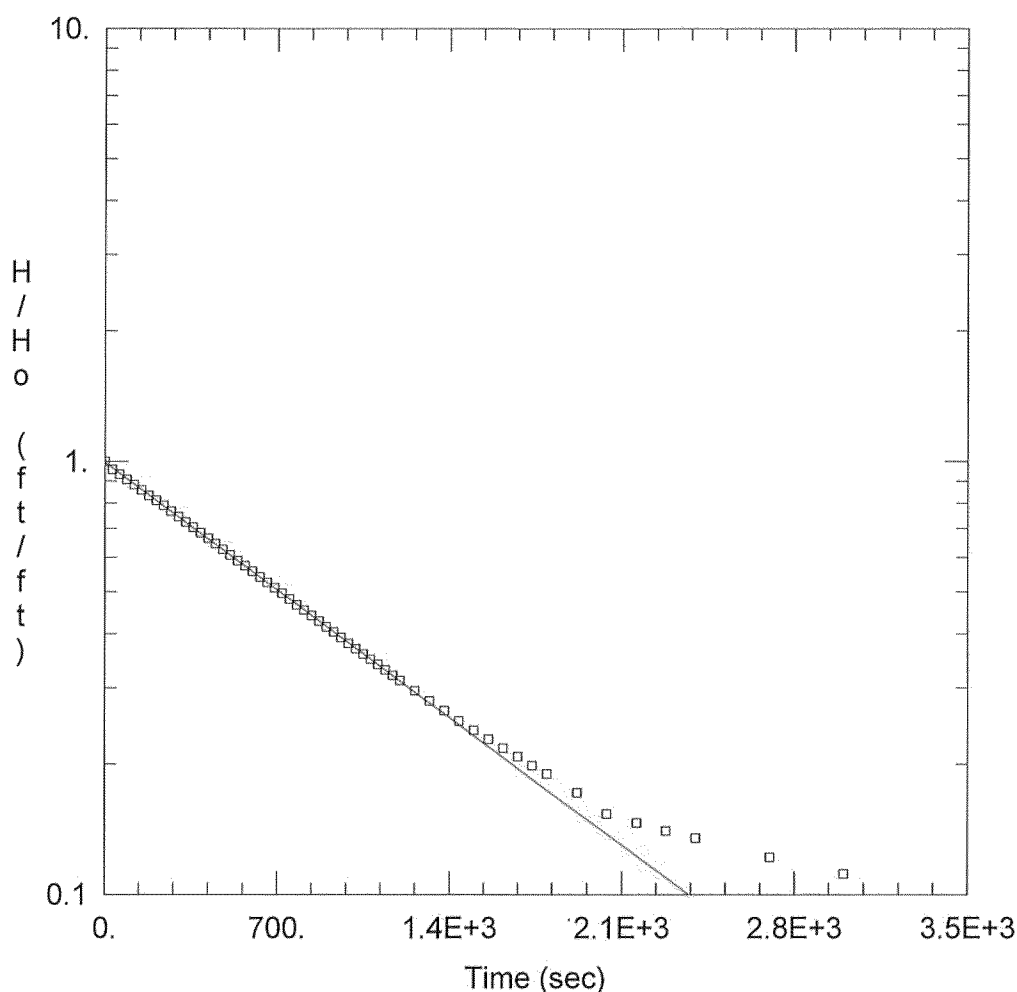
Streams			
Stream 1	Stream 1 is an intermittent stream that flows from north to south into the permit along the north edge of the permit boundary along Seven Hills Road on the west side of Pigeon Creek. A portion of Stream 1 appears to be the paleochannel of Pigeon Creek prior to its dredging and straightening for the Wabash Erie Canal. Various lengths along this stream will be either removed from impacts, impacted, or avoided.		
	3,710 linear feet will be removed from impacts (upstream section)	No direct or indirect impacts are expected as there will be no change in drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction	No impact
	6,048 linear feet will be impacted (middle section)	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact
	1,152 linear feet will be avoided (downstream section)	No direct impacts are expected, but there may be indirect impacts resulting from the change in drainage area due to a portion of the lateral drainage area being intercepted by the open pit when mining is occurring. Overland Flow Diversions (OFD L-4 and L-3) will maintain approximately 80% of the existing flow to this portion of Stream 1. There may be potential for minor accumulation of sediment due to construction of OFD L-4 and L-3 prior to stabilization with vegetation but it should be minimal	Minimal indirect impacts
Stream 1.4	Stream 1.4 is a sinuous ephemeral tributary to Stream 1 located entirely within the PFO 1 wetland on the west side of Pigeon Creek. The stream flows from north to southwest to its confluence with Stream 1 in the mining area. The stream will be avoided in its headwaters and impacted by mining at its downstream end.		
	1,319 linear feet will be avoided (upstream section)	No direct or indirect impacts are expected as there will be no change in drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction. Flow will be perpetuated through Overland Flow Diversion (OFD L-4)	No impact

	501 linear feet will be impacted (downstream section)	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact
Stream 4	Stream 4 is an intermittent stream that drains a western section of the western lateral watershed of Pigeon Creek. The stream flows from west to east and confluences around midway within the Seven Hills permit. The western upstream segment is located within the mining area and will be impacted while the downstream portion is located within the avoidance area.		
	1,300 linear feet will be impacted (upstream section)	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact
	588 linear feet will be avoided (downstream section)	No direct impacts are expected, but there is potential for indirect impacts. This downstream portion will serve as the outlet ditch for Sediment Basin 001. This sediment basin will be constructed on the inside of the temporary levee to serve as drainage control for the mining operation. The water level in the basin will be maintained by four 60" CMP structures with flap gates to prevent Pigeon Creek flood waters to flow back into the sediment basin. Indirect impacts may include extended baseflow when the SB 001 is discharging that may include more volume and/or increase velocity which may result in increased erosion and scour. There will be no change in drainage area as the majority of the surface water upstream will be collected in the sediment basin to discharge into Stream 4.	Minimal indirect impacts
Wetlands			
PEM 3	PEM 3 is a palustrine emergent wetland that is found along the fringes of the southern end of Open Water 3 (OW3). There will be direct impacts to part of the wetland due to utilizing the majority of OW3 for spoil disposal.		
	1.10 acres will be impacted	Direct impacts will be for filling the wetland for spoil disposal	Direct impact
	4.60 acres will be avoided	No direct impacts are expected, but there is potential for indirect impacts due to the changes in water level of OW3 during the spoil disposal. This may result in changes in vegetation along the fringes, but the primary vegetation is <i>Phragmites australis</i> , which is an undesirable species.	Minimal indirect impacts
PEM 6	PEM 6 is a palustrine emergent wetland that is found along the fringes of Open Water 5 (OW5). There will be direct impacts		

	to part of the wetlands due to disturbance resulting from grading spoil into OW5 to increase floodway capacity on the east side of Pigeon Creek		
	5.21 acres will be impacted	Direct impacts will be for filling the wetland for spoil disposal	Direct impact
	2.80 acres will be avoided	No direct impacts are expected, but there is potential for indirect impacts due to the changes in water level of OW 5 during the spoil disposal. This may result in changes in vegetation along the fringes, but the primary vegetation is <i>Phragmites australis</i> , which is an undesirable species.	Minimal indirect impacts
PEM 8	PEM 8 is a very small emergent wetland that will be partially impacted due to it being located along a potential path to bring equipment in on the east side of Pigeon Creek to conduct the spoil excavation to increase the floodway capacity for the floodway model.		
	0.04 acres will be impacted	Direct impacts may include filling the wetland with road base (i.e. aggregate) to provide a stable foundation to drive equipment.	Direct impact
	0.02 acres will be avoided	Limited indirect impacts are expected. Potential impacts may include the filling of wetlands with road base material after a large rain	Minimal indirect impacts
PEM 15	PEM 15 is a palustrine emergent wetland that is found along the fringes of Open Water 6 (OW6). There will be direct impacts to part of the wetlands due to disturbance resulting from grading spoil into OW6 to increase floodway capacity on the east side of Pigeon Creek		
	5.26 acres will be avoided	No direct impacts are expected, but there is potential for indirect impacts due to the changes in water level of OW3 during the spoil disposal. This may result in changes in vegetation along the fringes, but the primary vegetation is <i>Phragmites australis</i> , which is an undesirable species.	Minimal indirect impacts
	2.21 acres will be impacted	Direct impacts will be for filling the wetland for spoil disposal	Direct impact
PFO 1	PFO 1 is a large palustrine forested wetland located on the west side of Pigeon Creek. Portions of the wetland will be avoided, impacted, or removed from impacts		
	211.14 acres will be avoided	No direct or indirect impacts are expected as there will be no change in drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction	No impact
	65.56 acres will be removed	No direct or indirect impacts are expected as there will be no change in	No impact

		drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction	
	299.00 acres will be impacted	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact
PFO 3	PFO 3 is a large wetland located on the east side of Pigeon Creek. The majority of the wetlands will be avoided, but there may be portions that may be directly impacted due to being located along a potential path to bring equipment in on the east side of Pigeon Creek to conduct the spoil excavation to increase the floodway capacity for the floodway model.		
	1.85 acres will be impacted	Direct impacts may include filling the wetland with road base (i.e. aggregate) to provide a stable foundation to drive equipment.	Direct impact
	19.21 acres will be avoided	Limited indirect impacts are expected. Potential impacts may include the additional filling of wetlands with road base material after a large rain	Minimal indirect impacts
PSS 7	PSS 7 is a large shrub scrub wetland located on the west side of Pigeon Creek		
	4.07 acres will be avoided	No direct or indirect impacts are expected as there will be no change in drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction	No impact
	9.36 acres will be impacted	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact
PSS 14	PSS 14 is a small shrub scrub wetland that will be partially impacted due to it being located along a potential path to bring equipment in on the east side of Pigeon Creek to conduct the spoil excavation to increase the floodway capacity for the floodway model.		
	0.16 acres will be impacted	Direct impacts may include filling the wetland with road base (i.e. aggregate) to provide a stable foundation to drive equipment.	Direct impact
	0.16 acres will be avoided	Limited indirect impacts are expected. Potential impacts may include the additional filling of wetlands with road base material after a large rain	Minimal indirect impacts
IRW32	IRW32 is a small forested wetland located in a reclaimed setting. The majority of the wetlands will be impacted for coal extraction activities as well as levee construction.		
	0.30 acres will be avoided	No direct or indirect impacts are expected as there will be no change in	No impact

		drainage area, surface hydrology, adjacent vegetation loss, or impacts due to coal extraction and levee construction	
	4.12 acres will be impacted	Direct impact will be for filling for levee construction and/or removing for coal extraction	Direct impact



MW-3 RISING HEAD TEST

Data Set: X:\AQTESOLV\Slug tests\Seven Hills MW3 Rising.aqt

Date: 09/01/17

Time: 15:49:44

PROJECT INFORMATION

Company: Peabody Midwest Mining, LLC

Location: Seven Hills Mine

Test Well: MW-13

Test Date: 9/01/2017

AQUIFER DATA

Saturated Thickness: 25.97 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-3)

Initial Displacement: 11.47 ft

Static Water Column Height: 25.97 ft

Total Well Penetration Depth: 34. ft

Screen Length: 27. ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 1.87E-5 cm/sec

y0 = 11.42 ft

AQTESOLV for Windows

MW-3 Rising Head Test

Data Set: X:\AQTESOLV\Slug tests\Seven Hills MW3 Rising.aqt

Title: MW-3 Rising Head Test

Date: 09/01/17

Time: 15:50:10

PROJECT INFORMATION

Company: Peabody Midwest Mining, LLC

Location: Seven Hills Mine

Test Date: 9/01/2017

Test Well: MW-13

AQUIFER DATA

Saturated Thickness: 25.97 ft

Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: MW-3

X Location: 0. ft

Y Location: 0. ft

Initial Displacement: 11.47 ft

Static Water Column Height: 25.97 ft

Casing Radius: 0.08333 ft

Well Radius: 0.08333 ft

Well Skin Radius: 0.333 ft

Screen Length: 27. ft

Total Well Penetration Depth: 34. ft

No. of Observations: 63

Observation Data			
Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
0.	11.47	960.	4.5
30.	10.99	990.	4.36
60.	10.7	1020.	4.24
90.	10.41	1050.	4.12
120.	10.13	1080.	4.01
150.	9.85	1110.	3.9
180.	9.57	1140.	3.79
210.	9.32	1170.	3.68
240.	9.07	1200.	3.58
270.	8.8	1260.	3.39
300.	8.55	1320.	3.21
330.	8.3	1380.	3.05
360.	8.08	1440.	2.89
390.	7.85	1500.	2.75
420.	7.62	1560.	2.62
450.	7.4	1620.	2.5
480.	7.18	1680.	2.39
510.	6.98	1740.	2.28
540.	6.77	1800.	2.18
570.	6.58	1920.	1.97
600.	6.39	2040.	1.76
630.	6.2	2160.	1.68
660.	6.02	2280.	1.61
690.	5.85	2400.	1.55
720.	5.69	2700.	1.4
750.	5.51	3000.	1.28
780.	5.35	3600.	1.07
810.	5.2	5400.	0.68
840.	5.05	7200.	0.48
870.	4.91	1.08E+4	0.3
900.	4.76	1.44E+4	0.24
930.	4.63		

SOLUTION

Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
 $\ln(R_e/r_w)$: 4.737

VISUAL ESTIMATION RESULTSEstimated Parameters

<u>Parameter</u>	<u>Estimate</u>	
K	1.87E-5	cm/sec
y0	11.42	ft

$$T = K \cdot b = 0.0148 \text{ cm}^2/\text{sec}$$

COLLECTION DITCH DIVERSION
CDD 001C

Seven Hills Mine

Permit S-357

SEDCAD 4 for Windows

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2

General Information***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	4.700 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	=>	End	0.000	0.000	CDD 001C

#1 Chan'l

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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	1,235.000	1,235.000	1,008.64	201.43

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Structure Detail:***Structure #1 (Vegetated Channel)****CDD 001C*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
30.00	2.0:1	2.0:1	0.1	D, B	0.32			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	1,008.64 cfs		1,008.64 cfs	
Depth:	5.10 ft	5.42 ft	6.18 ft	6.50 ft
Top Width:	50.42 ft	51.70 ft	54.71 ft	55.99 ft
Velocity:	4.92 fps		3.85 fps	
X-Section Area:	205.21 sq ft		261.72 sq ft	
Hydraulic Radius:	3.885 ft		4.541 ft	
Froude Number:	0.43		0.31	
Roughness Coefficient:	0.0237		0.0335	

SEDCAD 4 for Windows

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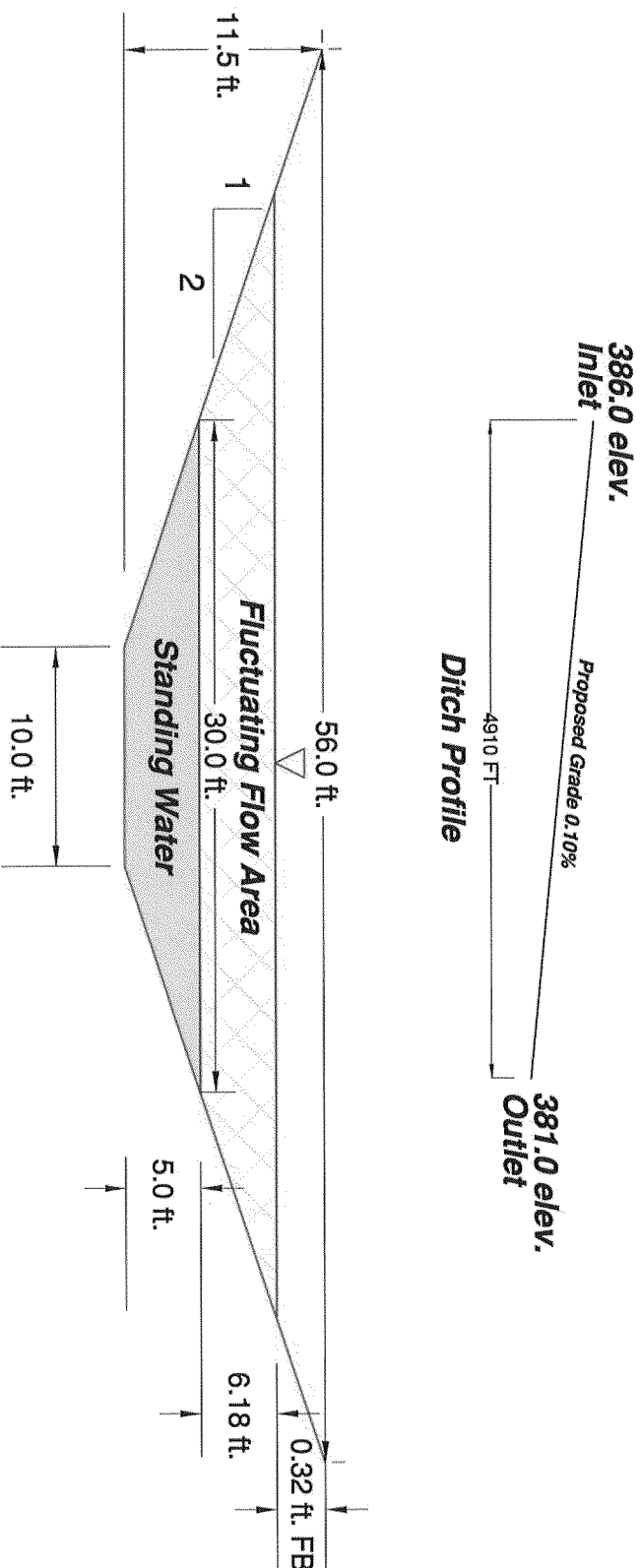
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1,235.000	1.657	0.000	0.000	78.000	M	1,008.64	201.426
Σ		1,235.000						1,008.64	201.426

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	4. Cultivated, straight row	4.40	22.00	500.00	1.870	0.074
		8. Large gullies, diversions, and low flowing streams	0.55	69.00	12,600.00	2.210	1.583
#1	1	Time of Concentration:					1.657

CDD 001C, COLLECTION DITCH DIVERSION TYPICAL CONVEYANCE SECTION



Trapezoidal Channel
Equal Side Slopes
Channel Lining: Vegetated

Note: Rip Rap check dams or other channel stabilization methods will be utilized if required.

UMLLC

566 Dickeyville Road, Lynnville IN

CDD-001C

Collection Ditch Diversion Section

Seven Hills Mine

Permit S-357

DATE: 8-17-2017

REVISION NO.

DATE

ENGINEER: KAP

TECH:

SCALE: not to scale

NOTES:

SHEET 1 OF 1

COLLECTION DITCH DIVERSION

CDD 001A

Seven Hills Mine

Permit S-357

SEDCAD 4 for Windows

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General Information***Storm Information:***

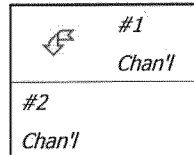
Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	4.700 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#2	0.000	0.000	CDD 001C
Channel	#2	==>	End	0.000	0.000	CDD 001A



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	1,235.000	1,235.000	1,008.64	201.43
#2	83.000	1,318.000	1,070.42	215.92

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Structure Detail:***Structure #1 (Vegetated Channel)****CDD 001C*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
30.00	2.0:1	2.0:1	0.1	D, B	0.32			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	1,008.64 cfs		1,008.64 cfs	
Depth:	5.10 ft	5.42 ft	6.18 ft	6.50 ft
Top Width:	50.42 ft	51.70 ft	54.71 ft	55.99 ft
Velocity:	4.92 fps		3.85 fps	
X-Section Area:	205.21 sq ft		261.72 sq ft	
Hydraulic Radius:	3.885 ft		4.541 ft	
Froude Number:	0.43		0.31	
Roughness Coefficient:	0.0237		0.0335	

Structure #2 (Vegetated Channel)*CDD 001A*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
30.00	2.0:1	2.0:1	0.1	D, B	0.31			5.0

Vegetated Channel Results:

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	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	1,070.42 cfs		1,070.42 cfs	
Depth:	5.23 ft	5.54 ft	6.29 ft	6.60 ft
Top Width:	50.93 ft	52.17 ft	55.16 ft	56.40 ft
Velocity:	5.06 fps		4.00 fps	
X-Section Area:	211.70 sq ft		267.81 sq ft	
Hydraulic Radius:	3.965 ft		4.607 ft	
Froude Number:	0.44		0.32	
Roughness Coefficient:	0.0233		0.0326	

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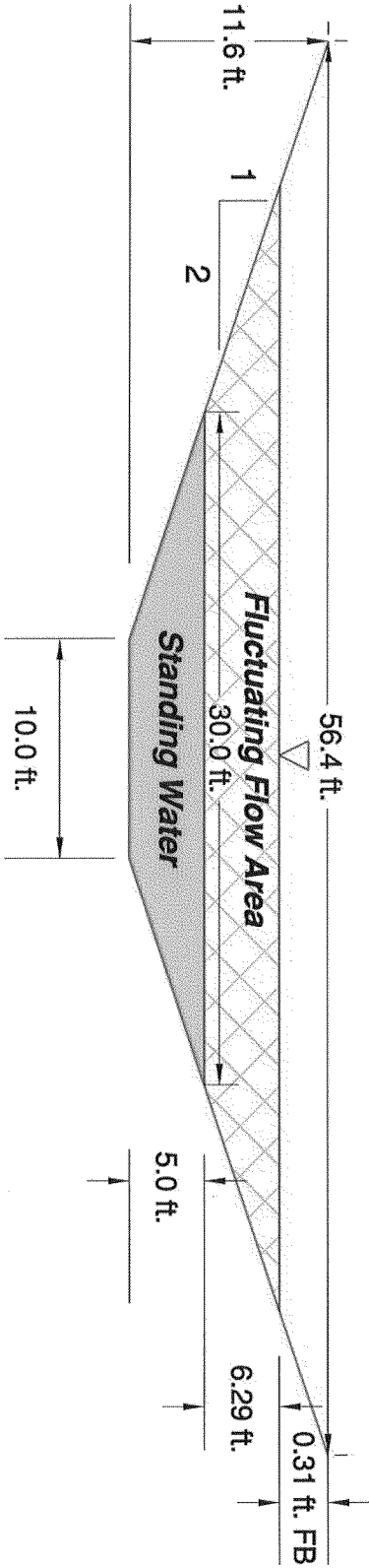
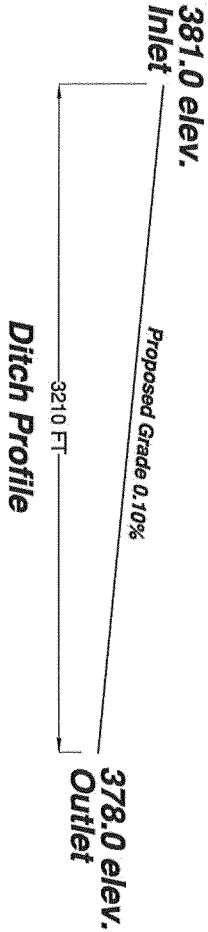
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1,235.000	1.657	0.000	0.000	78.000	M	1,008.64	201.426
Σ		1,235.000						1,008.64	201.426
#2	1	83.000	0.793	0.000	0.000	80.000	M	119.58	14.495
Σ		1,318.000						1,070.42	215.922

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	4. Cultivated, straight row	4.40	22.00	500.00	1.870	0.074
		8. Large gullies, diversions, and low flowing streams	0.55	69.00	12,600.00	2.210	1.583
#1	1	Time of Concentration:					1.657
#2	1	1. Forest with heavy ground litter	8.00	40.00	500.00	0.710	0.195
		8. Large gullies, diversions, and low flowing streams	0.25	8.00	3,210.00	1.490	0.598
#2	1	Time of Concentration:					0.793

**CDD 001A, COLLECTION DITCH DIVERSION
TYPICAL CONVEYANCE SECTION**



**Trapezoidal Channel
Equal Side Slopes**

Channel Lining: Vegetated

**Note: Rip Rap check dams or other channel stabilization
methods will be utilized if required.**

UM LLC

566 Dickeyville Road, Lynnville IN

CDD-001A

Collection Ditch Diversion Section

Seven Hills Mine

Permit S-357

DATE: 8-17-2017

ENGINEER: KAP

TECH:

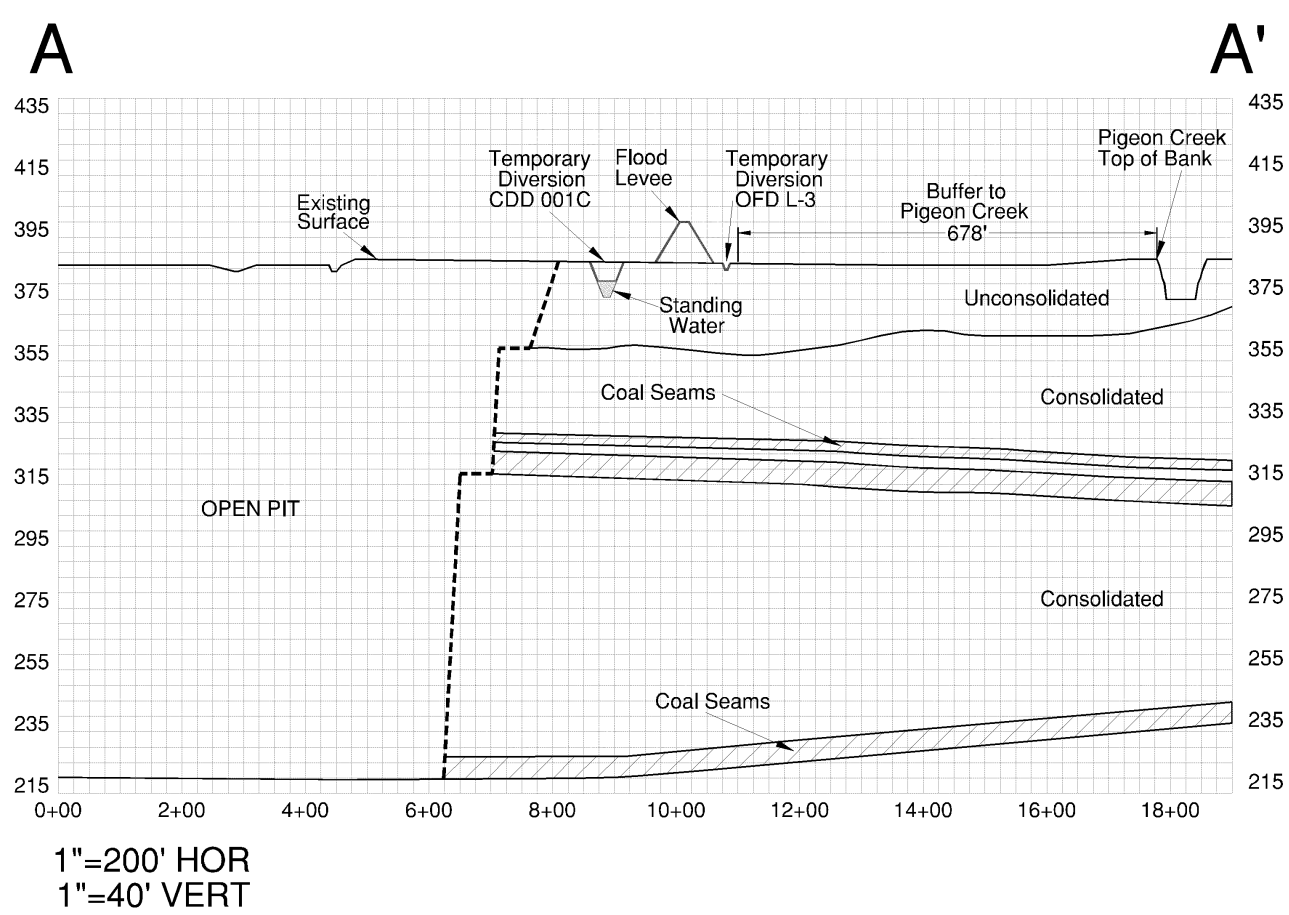
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SHEET 1 OF 1

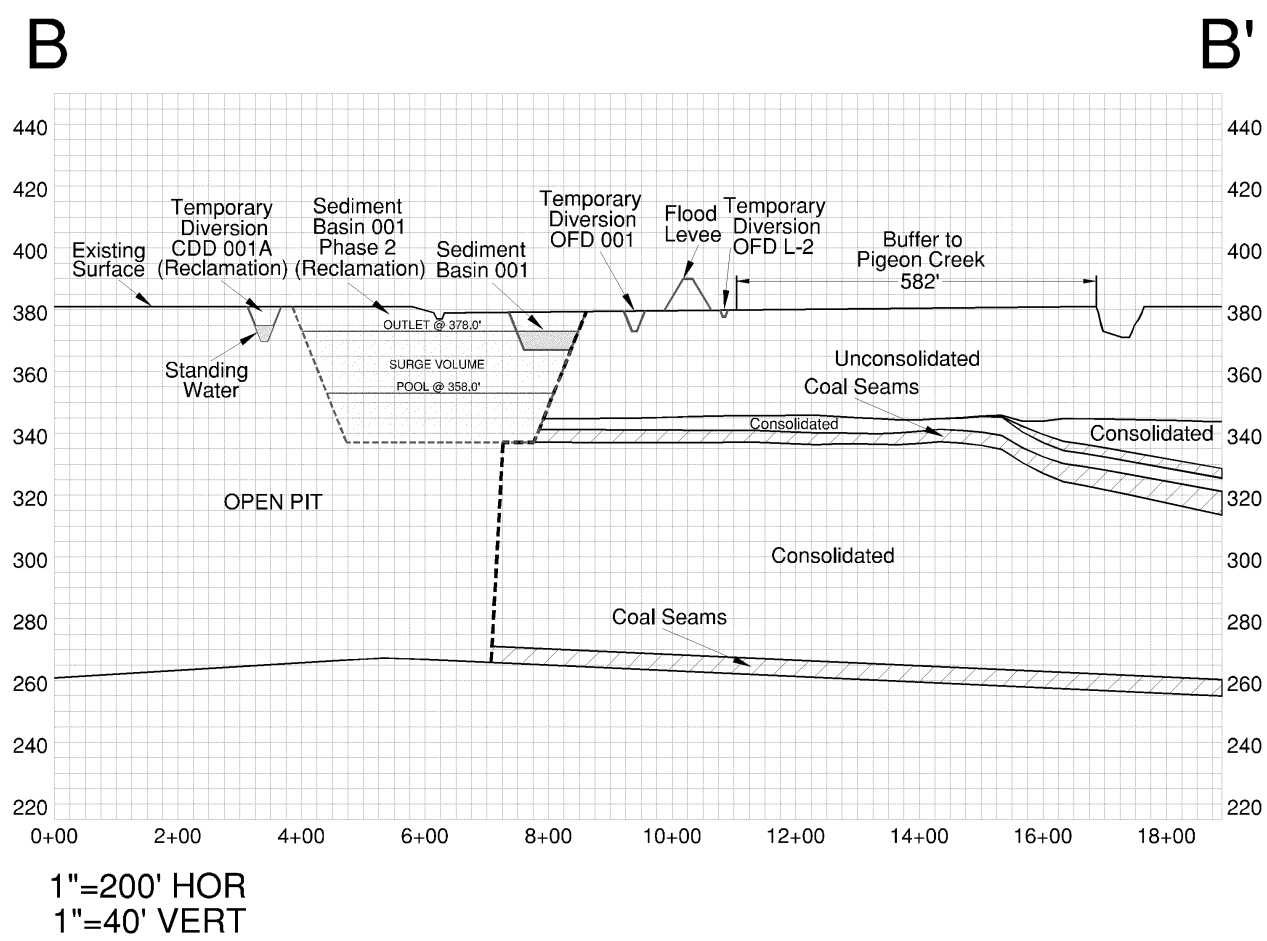
REVISION NO.

DATE

NOTES:



United Minerals Co., LLC. Lynnville, IN		
TYPICAL PROFILE A - A' OPEN PIT THROUGH PIGEON CREEK		
Seven Hills Mine Warrick County IN.		
DATE:	6-5-17	REVISION NO. DATE
ENGINEER:	MDE	
SCALE:	As-noted	
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United Minerals Co., LLC. Lynnville, IN		
TYPICAL PROFILE B-B' OPEN PIT THROUGH PIGEON CREEK		
Seven Hills Mine Warrick County IN.		
DATE: 6-5-17	REVISION NO.	DATE
ENGINEER: MDE		
SCALE: As-noted		
G:\ENGIN\Project Areas\WSS\Seven Hills\Drawings\Waterford designs\PLANS\B-B'		

LEVEE CULVERT PIPES **LCP-1**

Seven Hills Mine
Permit S-357

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General Information***Storm Information:***

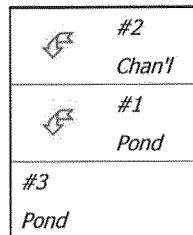
Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	4.700 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	#3	0.000	0.000	SB 001
Channel	#2	==>	#3	0.000	0.000	OFD 001
Pond	#3	==>	End	0.000	0.000	LCP-1



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#2	384.200	384.200	312.14	62.67
#1 In	142.000	142.000	308.02	26.60
Out			133.32	26.60
#3 In	0.000	526.200	430.48	89.27
Out			430.27	89.27

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5

Structure Detail:***Structure #2 (Vegetated Channel)****OFD 001*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
8.00	2.0:1	2.0:1	0.4	D, B	0.58			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	312.14 cfs		312.14 cfs	
Depth:	3.52 ft	4.10 ft	4.42 ft	5.00 ft
Top Width:	22.07 ft	24.39 ft	25.70 ft	28.02 ft
Velocity:	5.90 fps		4.19 fps	
X-Section Area:	52.87 sq ft		74.53 sq ft	
Hydraulic Radius:	2.228 ft		2.683 ft	
Froude Number:	0.67		0.43	
Roughness Coefficient:	0.0265		0.0423	

Structure #1 (Pond)*SB 001*

Pond Inputs:

Initial Pool Elev:	378.00 ft
Initial Pool:	26.19 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
378.00	20.00	3.00:1	3.00:1	13.00

Pond Results:

Peak Elevation:	380.06 ft
Dewater Time:	0.79 days

Dewatering time is calculated from peak stage to lowest spillway

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Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
372.00	3.760	0.000	0.000	
373.00	3.955	3.857	0.000	
374.00	4.154	7.911	0.000	
375.00	4.358	12.167	0.000	
376.00	4.567	16.629	0.000	
377.00	4.781	21.303	0.000	
378.00	5.000	26.193	0.000	Spillway #1
379.00	5.200	31.293	33.646	16.45
380.00	5.404	36.594	124.724	2.30
380.06	5.417	36.914	133.322	0.20 Peak Stage
381.00	5.611	42.101	272.835	
382.00	5.823	47.818	480.743	
383.00	6.038	53.748	753.192	
384.00	6.257	59.895	1,094.864	
385.00	6.480	66.263	1,510.219	

Detailed Discharge Table

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
372.00	0.000	0.000
373.00	0.000	0.000
374.00	0.000	0.000
375.00	0.000	0.000
376.00	0.000	0.000
377.00	0.000	0.000
378.00	0.000	0.000
379.00	33.646	33.646
380.00	124.724	124.724
381.00	272.835	272.835
382.00	0.000	480.743
383.00	0.000	753.192
384.00	0.000	1,094.864
385.00	0.000	1,510.219

Structure #3 (Pond)

LCP-1

Pond Inputs:

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7

Initial Pool Elev:	378.00 ft
Initial Pool:	0.00 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Pond Results:

Peak Elevation:	383.11 ft
Dewater Time:	0.77 days

*Dewatering time is calculated from peak stage to lowest spillway*Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
377.99	0.000	0.000	0.000	

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Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
378.00	0.000	0.000	0.000	Spillway #1 Spillway #2 Spillway #3 Spillway #4
378.99	0.000	0.000	56.299	14.75
379.99	0.000	0.000	137.998	1.75
380.99	0.000	0.000	208.435	0.75
381.99	0.000	0.000	287.285	0.35
382.99	0.000	0.000	415.022	0.70
383.11	0.000	0.001	430.266	0.15 Peak Stage
383.99	0.000	0.001	546.321	
384.99	0.000	0.001	675.837	
385.00	0.000	0.001	677.031	

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
377.99	0.000	0.000	0.000	0.000	0.000
378.00	0.000	0.000	0.000	0.000	0.000
378.99	(1)>14.075	(1)>14.075	(1)>14.075	(1)>14.075	56.299
379.99	(1)>34.499	(1)>34.499	(1)>34.499	(1)>34.499	137.998
380.99	(1)>52.109	(1)>52.109	(1)>52.109	(1)>52.109	208.435
381.99	(1)>71.821	(1)>71.821	(1)>71.821	(1)>71.821	287.285
382.99	(1)>103.756	(1)>103.756	(1)>103.756	(1)>103.756	415.022
383.99	(3)>136.580	(3)>136.580	(3)>136.580	(3)>136.580	546.321
384.99	(6)>168.959	(6)>168.959	(6)>168.959	(6)>168.959	675.837
385.00	(6)>169.258	(6)>169.258	(6)>169.258	(6)>169.258	677.031

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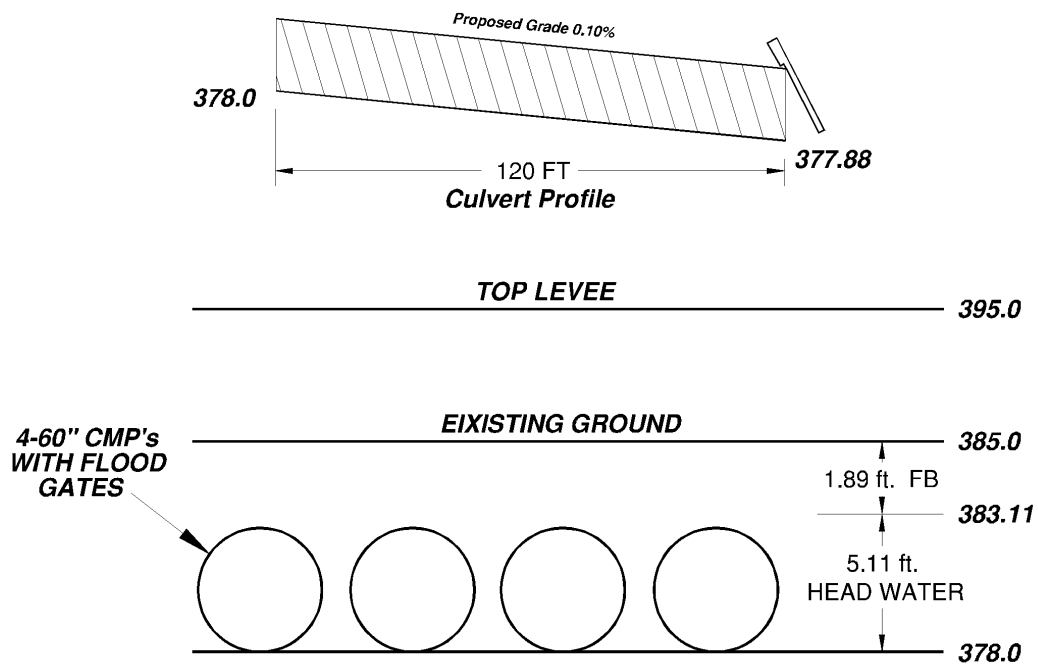
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#2	1	384.200	1.669	0.000	0.000	78.000	M	312.14	62.667
	Σ	384.200						312.14	62.667
#1	1	142.000	0.414	0.000	0.000	82.000	M	308.02	26.600
	Σ	142.000						308.02	26.600
#3	Σ	526.200						430.48	89.269

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	3.20	16.00	500.00	1.430	0.097
		8. Large gullies, diversions, and low flowing streams	1.29	50.00	3,881.00	3.400	0.317
#1	1	Time of Concentration:					0.414
#2	1	1. Forest with heavy ground litter	12.00	60.00	500.00	0.870	0.159
		8. Large gullies, diversions, and low flowing streams	0.44	48.00	10,820.00	1.990	1.510
#2	1	Time of Concentration:					1.669

**LCP-1, LEVEE CULVERT PIPE
TYPICAL CONVEYANCE SECTION**



UMI LLC
566 Dickeyville Road, Lynnville IN

LCP-1
LEVEE CULVERT PIPE
Seven Hills Mine
Permit S-357

DATE: 8-24-2017	REVISION NO.	DATE
ENGINEER:		
TECH:		
SCALE: not to scale	NOTES:	
SHEET 1 OF 1		



OVERLAND FLOW DIVERSION **OFD 001**

Seven Hills Mine

Permit S-357

SEDCAD 4 for Windows

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General Information***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	4.700 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	OFD 001

#1 Chan'l

SEDCAD 4 for Windows

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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	384.200	384.200	439.84	62.70

SEDCAD 4 for Windows

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Structure Detail:***Structure #1 (Vegetated Channel)****OFD 001*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
8.00	3.0:1	3.0:1	0.4	D, B	0.37			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	439.84 cfs		439.84 cfs	
Depth:	3.75 ft	4.12 ft	4.63 ft	5.00 ft
Top Width:	30.52 ft	32.74 ft	35.80 ft	38.02 ft
Velocity:	6.09 fps		4.34 fps	
X-Section Area:	72.28 sq ft		101.45 sq ft	
Hydraulic Radius:	2.277 ft		2.720 ft	
Froude Number:	0.70		0.45	
Roughness Coefficient:	0.0261		0.0413	

SEDCAD 4 for Windows

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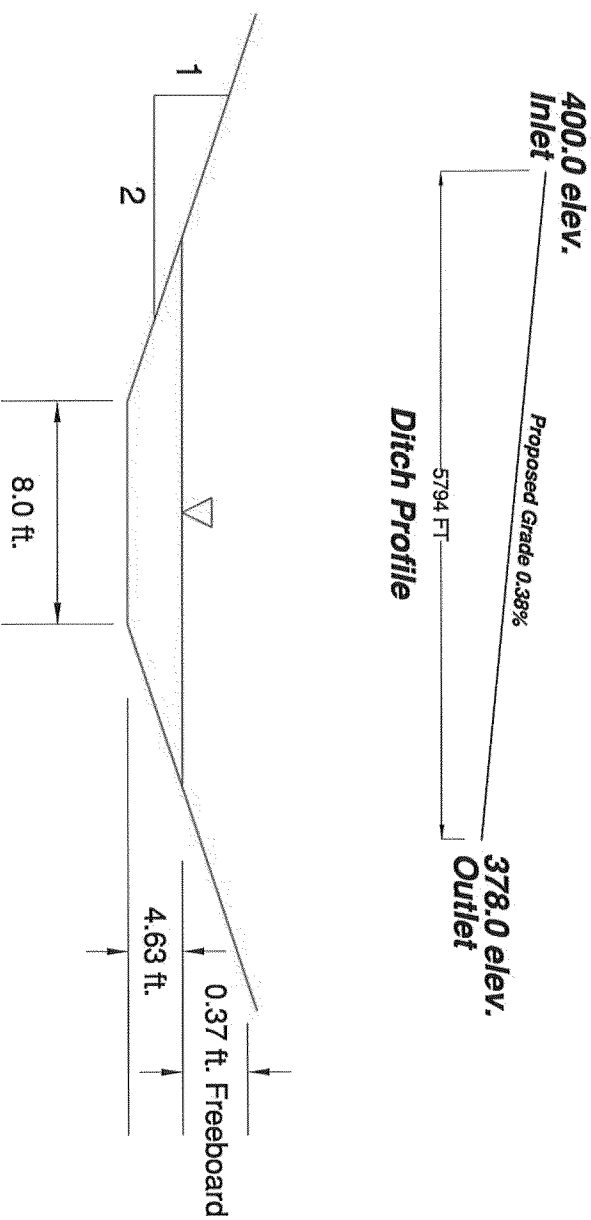
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	384.200	1.017	0.000	0.000	78.000	M	439.84	62.696
Σ		384.200						439.84	62.696

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	1. Forest with heavy ground litter	13.20	66.00	500.00	0.910	0.152
		8. Large gullies, diversions, and low flowing streams	1.36	148.00	10,880.00	3.490	0.865
#1	1	Time of Concentration:					1.017

OFD 001, OVERLAND FLOW DIVERSION
TYPICAL CONVEYANCE SECTION



Trapezoidal Channel
Equal Side Slopes
Channel Lining: Vegetated

Note: Rip Rap check dams or other channel stabilization methods will be utilized if required.

UMLLC

566 Dickeyville Road, Lymville IN

OFD 001

Overland Flow Diversion

Seven Hills Mine

Permit S-357

DATE: 8-17-2017

ENGINEER: KAP

TECH:

SCALE: not to scale

SHEET 1 OF 1

DATE

REVISION NO.

NOTES:

OVERLAND FLOW DIVERSION

OFD L-2

Seven Hills Mine

Permit S-357

SEDCAD 4 for Windows

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General Information***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	2 yr - 6 hr
Rainfall Depth:	2.400 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	OFD L-2

#1 Chan'l

SEDCAD 4 for Windows

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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	4.100	4.100	2.22	0.22

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Structure Detail:***Structure #1 (Vegetated Channel)******OFD L-2***

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
4.00	3.0:1	3.0:1	0.2	D, B	0.34			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	2.22 cfs		2.22 cfs	
Depth:	0.78 ft	1.12 ft	1.66 ft	2.00 ft
Top Width:	8.67 ft	10.71 ft	13.94 ft	15.98 ft
Velocity:	0.45 fps		0.15 fps	
X-Section Area:	4.94 sq ft		14.85 sq ft	
Hydraulic Radius:	0.553 ft		1.026 ft	
Froude Number:	0.10		0.03	
Roughness Coefficient:	0.0892		0.4056	

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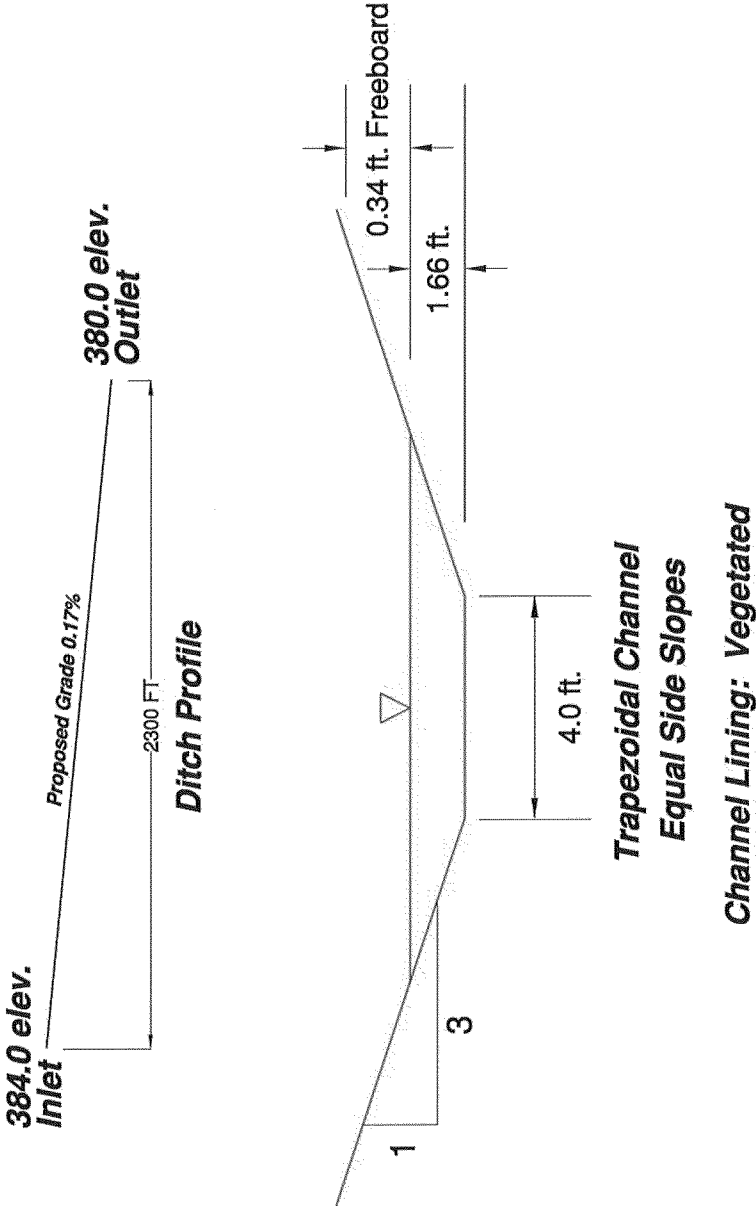
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	4.100	0.519	0.000	0.000	80.000	M	2.22	0.224
Σ		4.100						2.22	0.224

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.33	10.00	30.00	4.610	0.001
		8. Large gullies, diversions, and low flowing streams	0.17	4.00	2,314.00	1.240	0.518
#1	1	Time of Concentration:					0.519

OFD L-2, OVERLAND FLOW DIVERSION
TYPICAL CONVEYANCE SECTION



Note: Rip Rap check dams or other channel stabilization methods will be utilized if required.

Channel Lining: Vegetated

UMI LLC			
566 Dickeyville Road, Lynnville IN			
OFD L-2			
Overland Flow Diversion			
Seven Hills Mine			
Permit S-357			
DATE: 8-17-2017	REVISION NO.	DATE	
ENGINEER: KAP			
TECH:			
SCALE: not to scale	NOTES:		
SHEET 1	OF	1	

OVERLAND FLOW DIVERSION **OFD L-3**

Seven Hills Mine

Permit S-357

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General Information***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	2 yr - 6 hr
Rainfall Depth:	2.400 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	End	0.000	0.000	OFD L-3

#1 Chan'l

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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	3.450	3.450	2.03	0.19

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Structure Detail:***Structure #1 (Vegetated Channel)******OFD L-3***

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
4.00	3.0:1	3.0:1	0.2	D, B	0.38			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	2.03 cfs		2.03 cfs	
Depth:	0.75 ft	1.13 ft	1.62 ft	2.00 ft
Top Width:	8.51 ft	10.79 ft	13.70 ft	15.98 ft
Velocity:	0.43 fps		0.14 fps	
X-Section Area:	4.70 sq ft		14.31 sq ft	
Hydraulic Radius:	0.537 ft		1.006 ft	
Froude Number:	0.10		0.02	
Roughness Coefficient:	0.0911		0.4209	

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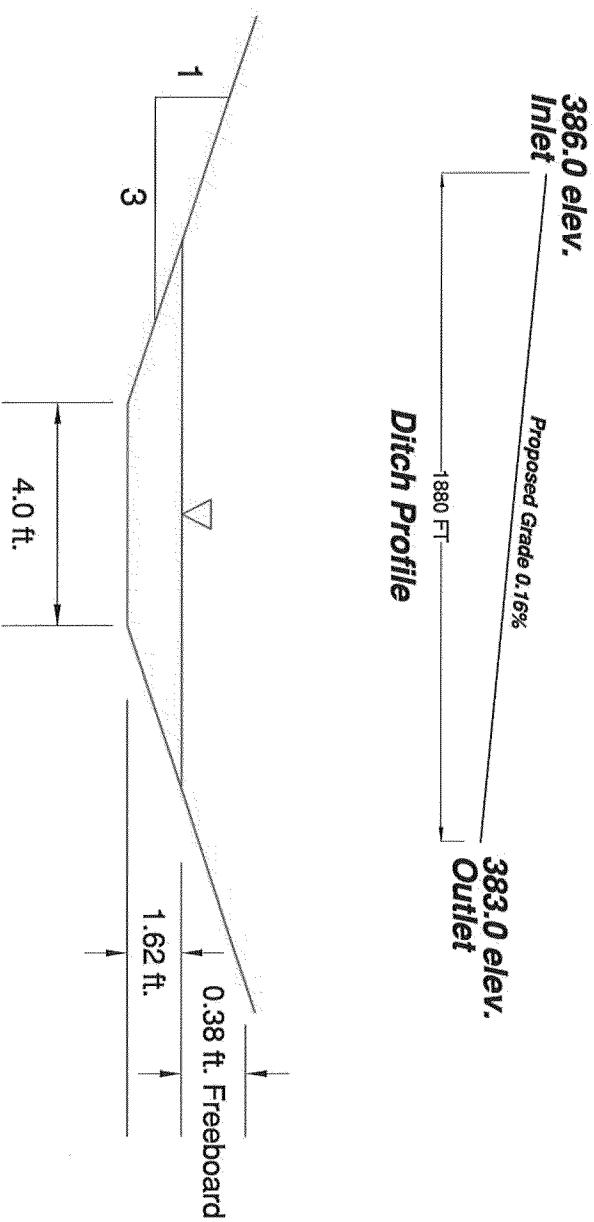
Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	3.450	0.439	0.000	0.000	80.000	M	2.03	0.188
Σ		3.450						2.03	0.188

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	33.33	9.00	27.00	4.610	0.001
		8. Large gullies, diversions, and low flowing streams	0.16	3.00	1,880.00	1.190	0.438
#1	1	Time of Concentration:					0.439

OFD L-3, OVERLAND FLOW DIVERSION
TYPICAL CONVEYANCE SECTION



Channel Lining: Vegetated

Note: Rip Rap check dams or other channel stabilization methods will be utilized if required.

UMLLC

566 Dickeyville Road, Lynnville IN

OFD L-3

Overland Flow Diversion

Seven Hills Mine

Permit S-357

DATE: 8-17-2017

ENGINEER: KAP

TECH:

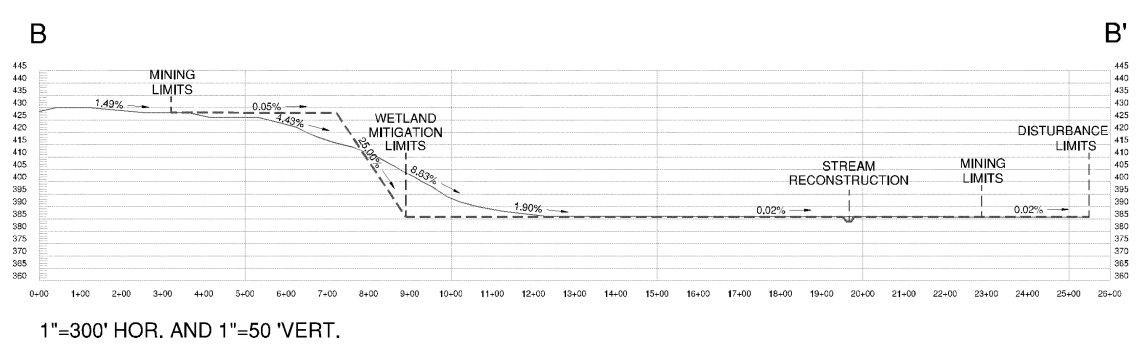
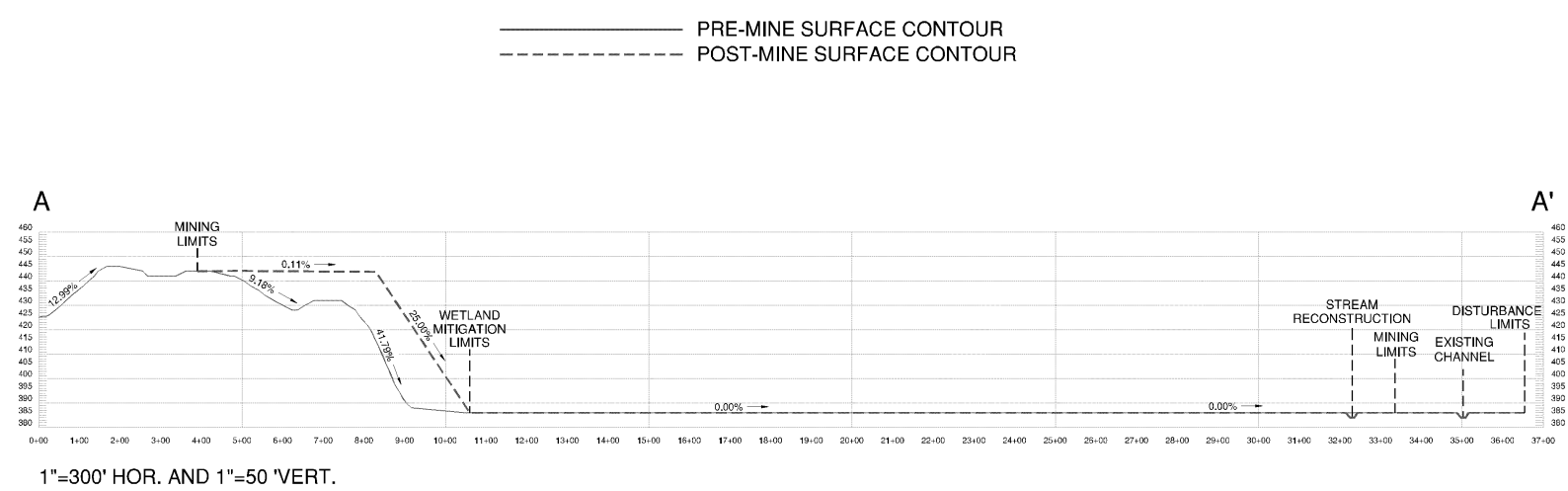
SCALE: not to scale

SHEET 1 OF 1

REVISION NO.

DATE

NOTES:



United Minerals Co., LLC. Lynnville, IN		
PRE AND POST MINE CROSS-SECTIONS A-A' and B-B'		
Seven Hills Mine Warrick County IN.		
DATE: 8-25-2017	REVISION NO.	DATE
ENGINEER: KAP		
SCALE: As-noted		
G:\ENGIN\Project Areas\WSS\Seven Hills\Drainage\Watershed designs\PL\N1_R1.dwg		

SEDIMENT BASIN
SB 001 PHASE 2
SPILLWAY DESIGN

Seven Hills Mine
Permit S-357

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General Information***Storm Information:***

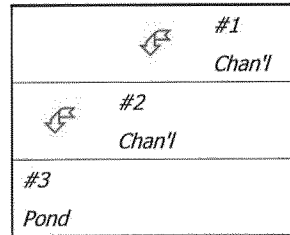
Storm Type:	NRCS Type II
Design Storm:	100 yr - 6 hr
Rainfall Depth:	4.700 inches

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Channel	#1	==>	#2	0.000	0.000	CDD 001C
Channel	#2	==>	#3	0.000	0.000	CDD 001A
Pond	#3	==>	End	0.000	0.000	SB 001 PHASE 2



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Structure Summary:

	Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	1,235.000	1,235.000	1,008.64	201.43
#2	83.000	1,318.000	1,070.42	215.92
#3 In	442.600	1,760.600	1,449.10	293.25
Out			323.16	113.20

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Structure Detail:***Structure #1 (Vegetated Channel)****CDD 001C*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
30.00	2.0:1	2.0:1	0.1	D, B	0.32			5.0

Vegetated Channel Results:

	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	1,008.64 cfs		1,008.64 cfs	
Depth:	5.10 ft	5.42 ft	6.18 ft	6.50 ft
Top Width:	50.42 ft	51.70 ft	54.71 ft	55.99 ft
Velocity:	4.92 fps		3.85 fps	
X-Section Area:	205.21 sq ft		261.72 sq ft	
Hydraulic Radius:	3.885 ft		4.541 ft	
Froude Number:	0.43		0.31	
Roughness Coefficient:	0.0237		0.0335	

Structure #2 (Vegetated Channel)*CDD 001A*

Trapezoidal Vegetated Channel Inputs:

Material: Grass mixture

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Retardance Classes	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)	Limiting Velocity (fps)
30.00	2.0:1	2.0:1	0.1	D, B	0.31			5.0

Vegetated Channel Results:

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	Stability Class D w/o Freeboard	Stability Class D w/ Freeboard	Capacity Class B w/o Freeboard	Capacity Class B w/ Freeboard
Design Discharge:	1,070.42 cfs		1,070.42 cfs	
Depth:	5.23 ft	5.54 ft	6.29 ft	6.60 ft
Top Width:	50.93 ft	52.17 ft	55.16 ft	56.40 ft
Velocity:	5.06 fps		4.00 fps	
X-Section Area:	211.70 sq ft		267.81 sq ft	
Hydraulic Radius:	3.965 ft		4.607 ft	
Froude Number:	0.44		0.32	
Roughness Coefficient:	0.0233		0.0326	

Structure #3 (Pond)*SB 001 PHASE 2*

Pond Inputs:

Initial Pool Elev:	358.00 ft
Initial Pool:	109.59 ac-ft

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Straight Pipe

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7

Barrel Diameter (in)	Barrel Length (ft)	Barrel Slope (%)	Manning's n	Spillway Elev (ft)	Entrance Loss Coefficient	Tailwater Depth (ft)
60.00	120.00	0.10	0.0150	378.00	0.90	0.00

Pond Results:

Peak Elevation:	382.27 ft
Dewater Time:	0.19 days

Dewatering time is calculated from peak stage to lowest spillway

Elevation-Capacity-Discharge Table

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
342.00	5.980	0.000	0.000	
342.01	5.981	0.060	0.000	
344.00	6.190	12.169	0.000	
346.00	6.402	24.761	0.000	
348.00	6.619	37.782	0.000	
350.00	6.839	51.240	0.000	
352.00	7.063	65.142	0.000	
354.00	7.291	79.495	0.000	
356.00	7.522	94.307	0.000	
358.00	7.756	109.585	0.000	
360.00	7.995	125.336	0.000	
362.00	8.237	141.566	0.000	
363.00	8.359	149.864	0.000	
364.00	8.482	158.284	0.000	
366.00	8.731	175.496	0.000	
368.00	8.983	193.210	0.000	
370.00	9.240	211.432	0.000	
372.00	9.499	230.170	0.000	
374.00	9.763	249.432	0.000	
376.00	10.030	269.223	0.000	
378.00	10.300	289.552	0.000	Spillway #1 Spillway #2 Spillway #3 Spillway #4
380.00	10.564	310.416	138.766	1.82*
382.00	10.832	331.812	288.492	2.20
382.27	10.870	334.746	323.161	0.65 Peak Stage
384.00	11.103	353.747	547.632	
385.00	11.240	364.918	677.033	

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**Designates time(s) to dewater have been extrapolated beyond the 50 hour hydrograph limit.*

Detailed Discharge Table

Elevation (ft)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Straight Pipe (cfs)	Combined Total Discharge (cfs)
342.00	0.000	0.000	0.000	0.000	0.000
342.01	0.000	0.000	0.000	0.000	0.000
344.00	0.000	0.000	0.000	0.000	0.000
346.00	0.000	0.000	0.000	0.000	0.000
348.00	0.000	0.000	0.000	0.000	0.000
350.00	0.000	0.000	0.000	0.000	0.000
352.00	0.000	0.000	0.000	0.000	0.000
354.00	0.000	0.000	0.000	0.000	0.000
356.00	0.000	0.000	0.000	0.000	0.000
358.00	0.000	0.000	0.000	0.000	0.000
360.00	0.000	0.000	0.000	0.000	0.000
362.00	0.000	0.000	0.000	0.000	0.000
363.00	0.000	0.000	0.000	0.000	0.000
364.00	0.000	0.000	0.000	0.000	0.000
366.00	0.000	0.000	0.000	0.000	0.000
368.00	0.000	0.000	0.000	0.000	0.000
370.00	0.000	0.000	0.000	0.000	0.000
372.00	0.000	0.000	0.000	0.000	0.000
374.00	0.000	0.000	0.000	0.000	0.000
376.00	0.000	0.000	0.000	0.000	0.000
378.00	0.000	0.000	0.000	0.000	0.000
380.00	(1)>34.691	(1)>34.691	(1)>34.691	(1)>34.691	138.766
382.00	(1)>72.123	(1)>72.123	(1)>72.123	(1)>72.123	288.492
384.00	(3)>136.908	(3)>136.908	(3)>136.908	(3)>136.908	547.632
385.00	(6)>169.258	(6)>169.258	(6)>169.258	(6)>169.258	677.033

SEDCAD 4 for Windows

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Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	1,235.000	1.657	0.000	0.000	78.000	M	1,008.64	201.426
Σ		1,235.000						1,008.64	201.426
#2	1	83.000	0.793	0.000	0.000	80.000	M	119.58	14.495
Σ		1,318.000						1,070.42	215.922
#3	1	442.600	0.786	0.000	0.000	80.000	M	641.17	77.329
Σ		1,760.600						1,449.10	293.251

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	4. Cultivated, straight row	4.40	22.00	500.00	1.870	0.074
		8. Large gullies, diversions, and low flowing streams	0.55	69.00	12,600.00	2.210	1.583
#1	1	Time of Concentration:					1.657
#2	1	1. Forest with heavy ground litter	8.00	40.00	500.00	0.710	0.195
		8. Large gullies, diversions, and low flowing streams	0.25	8.00	3,210.00	1.490	0.598
#2	1	Time of Concentration:					0.793
#3	1	1. Forest with heavy ground litter	12.00	60.00	500.00	0.870	0.159
		8. Large gullies, diversions, and low flowing streams	1.37	108.00	7,910.00	3.500	0.627
#3	1	Time of Concentration:					0.786

Sediment Basin Design Summary

24-Aug-17

I. General Information

Mine: Seven Hills Mine, Permit #357
 Basin: SB 001 PHASE 2

Basin Type: Incised
 Examination Exempt: Yes

II. Design Parameters:

Design Storm Event : (10yr/24hr)	R=	4.50	
Runoff Area (RA) (Treatment and Detention)	RA =	1760.60	
Runoff Curve Number:	CN =	80	
Unitless number	$S = ((1000)/Cn)-10 =$	2.50	
Runoff (Q) - Watershed Inches	$Q = ((P-0.2S)^2)/(P+0.8S) =$	2.46	
Runoff Coefficient (RC)	$RC = Q / R =$	0.55	0.547008547

III. Runoff Calculation:

$$RV = Q \text{ (in / 24hr)} * 1\text{ft}/12 \text{ in} * \text{Runoff Area (ac)} * 43,560 \text{ sq ft / ac}$$

Where: RV = runoff volume (cubic ft/24hr)
 Q = runoff design event (inches/24hr)

RV = 15,731.638 cubic ft /24hr 361.15 acre ft

IV. Treatment Volume Calculation:

Detention Time: DT	10 hours	
Sediment Volume: SV	1610960 cubic ft	
Pit Pumpage Volume: PV	1000 gpm	
Design Sediment Storage: SV (see USLE Calculations attached)	1610960 cubic ft	36.98 acre ft

$$MCV = RV \text{ cf / 24hr} * 1\text{day}/24\text{hr} * DT \text{ hr} + PV \text{ gpm} * 1440 \text{ min/day} * 1\text{day}/24\text{hr} * 0.1337 \text{ cf/gal} * DT \text{ hr} + SV \text{ cf}$$

Minimum Compliance volume=8,246,029 cubic ft 189.30 acre ft

Basin Freeboard:	2.0 ft minimum at pool	
Basin Surface area:	10.30 acres	448668 sq ft
Basin Minimum Average depth	18.38 ft	

Sediment Basin Design:
Universal Soil Loss Calculation:

24-Aug-17

Mine: Seven Hills Mine, Permit #357

Basin: SB 001 PHASE 2

Soil Loss per Unit Area:

$$A = R * K * LS * CP$$

$$A = 32.94 \text{ tons/acre}$$

where: A = Soil loss per acre (tons/acre)

R = Rainfall-Erosivity Factor 200

K = Soil Erodibility Factor 0.43

LS = Length Slope Factor 2.82

CP = Cropping Practice Factor 0.14

LS Factor Calculation

$$LS = (FSL/72.6)^m * ((430x^2 + 30x + 0.43) / 6.613)) = 2.82$$

where: FSL = Field Slope Length 900.00

x = Field Slope Ratio 0.0770

m = slope factor 0.5

slope < 3% m=0.3, = 4% m=0.4, >5% m=0.5

CP Weighted Factor Calculation

Ground Cover Description	CP Value	Area (ac)	CP*ac
Active Disturbed area	0.90	100.00	90.00
Reclaimed or Undisturbed	0.09	1660.60	149.45
		1760.60	239.45
			0.14 Weighted CP

Sediment Delivery Ratio:

$$D = Da * Dv * Dc * Dp$$

$$D = 0.25$$

where: D = sediment delivery ratio

Da = area delivery ratio 0.50

Dv = Vegetation trapping factor 1.00

Dc = Channelization factor 0.50

Dp = pit deposition factor 1.00

Sediment Yield From Design Watershed:

$$Y = A * D$$

$$Y = 8.24 \text{ tons/acre}$$

where: Y = Watershed Sediment Yield (Tons / Acre)

A = Soil loss per area (Tons / Acre)

D = Sediment Delivery Ratio

Life of Basin 5.0 years

Sediment Yield Conversion Ac ft / ac year:

$$Y2 (\text{ac ft} / \text{ac yr}) = (Y \text{ t/ac} * 2000 \text{ lb/t}) / (90 \text{ lb/cubic ft} * 43560 \text{ sq ft} / \text{ac})$$

$$Y2 = 0.00420 \text{ ac ft} / \text{ac yr}$$

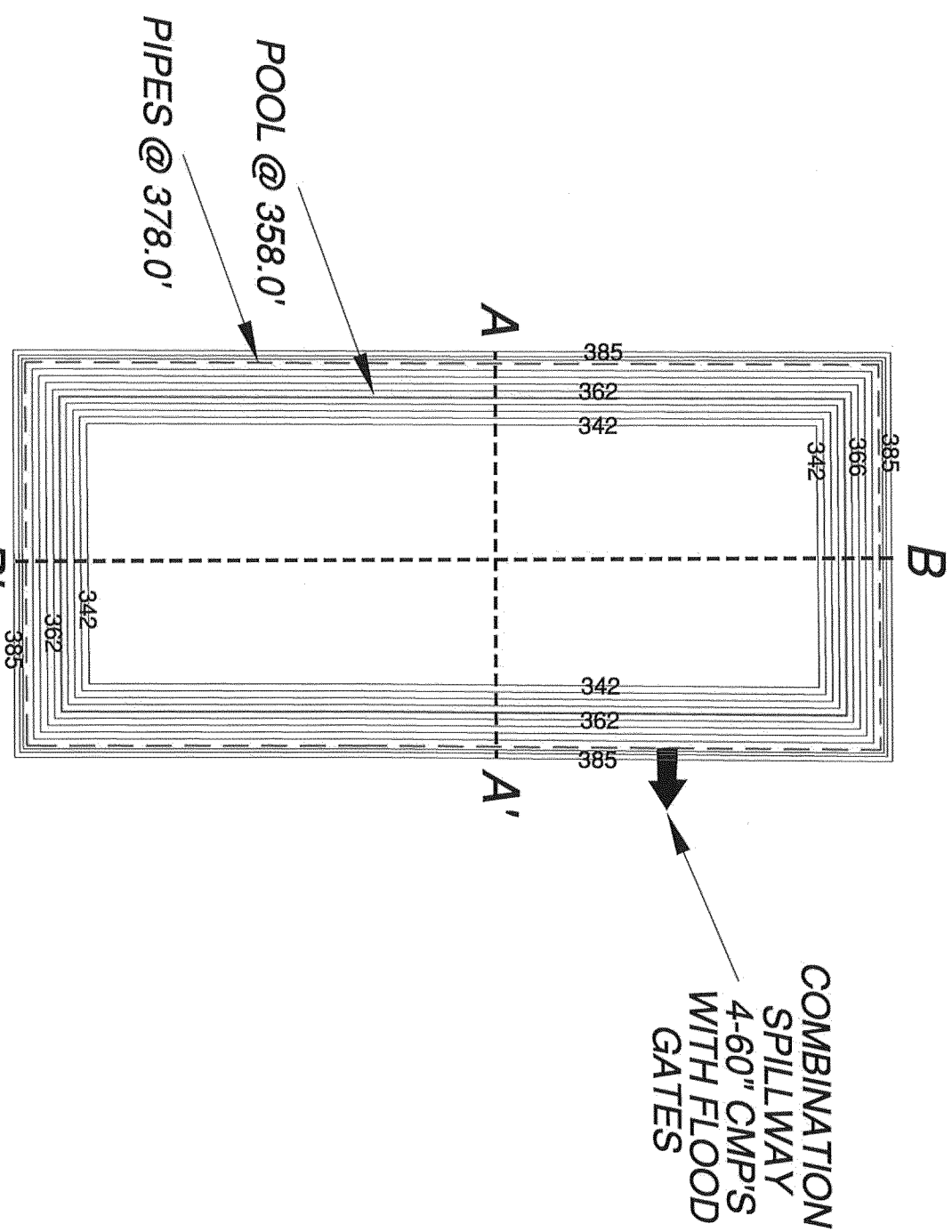
Sediment Storage Calculation:

$$SL = RA * Y2 * YR * 43560 \quad \text{Design Sediment Storage} =$$

1610960	cubic ft
36.98	Ac/ft

SB 001 Phase 2, Volume Summary

Surface Area : 10.3 acres
Impounded volume: 0.0 ac ft
Treatment volume: 289.75 ac ft
Minimum Compliance Volume: 189.30 ac ft
Surplus Volume: 100.45 ac ft



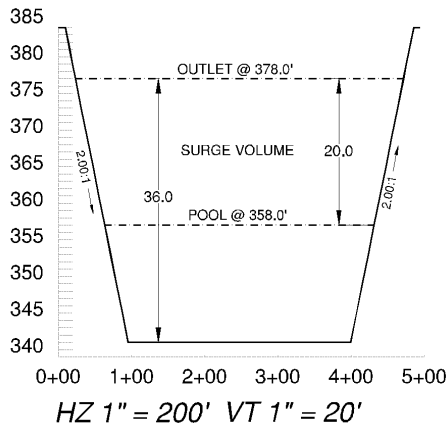
HOR. 1" = 200'



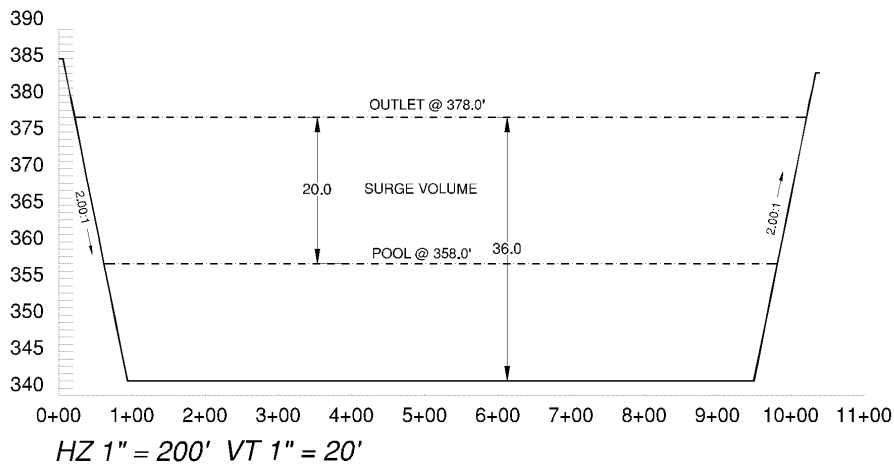
UM LLC 566 Dickeyville Road, Lynnville IN Sediment Control Basin SB 001 Phase 2 Plan View Seven Hills Mine, Permit S-357		DATE: 8-16-2017	REVISION NO.:	DATE:
SCALE: 1 in = 200 ft		NOTES:		
SHEET 1 OF 2				

SB 001 Phase 2

Cross-section A - A'

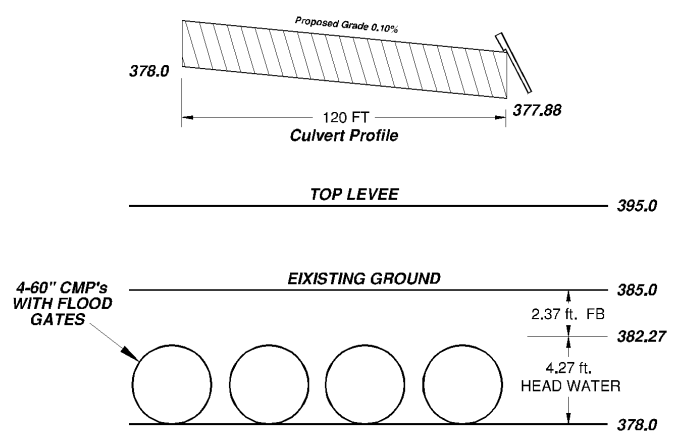


Cross-section B - B'



Combination Spillway

(LCP-1, LEVEE CULVERT PIPE)



UMI LLC

566 Dickeyville Road, Lynnville IN

Sediment Control Basin SB 001 Phase 2
Cross-sections and Spillway Section
Seven Hills Mine, Permit S-357

DATE: 8-16-2017

SCALE: As noted

SHEET 2 OF 2

REVISION NO.:

DATE:

NOTES:

SEDIMENT BASIN
SB 001
SPILLWAY DESIGN

Seven Hills Mine
Permit S-357

SEDCAD 4 for Windows

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General Information***Storm Information:***

Storm Type:	NRCS Type II
Design Storm:	25 yr - 6 hr
Rainfall Depth:	3.800 inches

SEDCAD 4 for Windows

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Structure Networking:

Type	Stru #	(flows into)	Stru #	Musk. K (hrs)	Musk. X	Description
Pond	#1	==>	End	0.000	0.000	SB 001

#1 Pond

SEDCAD 4 for Windows

Copyright 1998-2010 Pamela L. Schwab

Structure Summary:

		Immediate Contributing Area (ac)	Total Contributing Area (ac)	Peak Discharge (cfs)	Total Runoff Volume (ac-ft)
#1	In	142.000	142.000	222.52	19.23
	Out			85.17	19.23

SEDCAD 4 for Windows

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Structure Detail:***Structure #1 (Pond)******SB 001*****Pond Inputs:**

Initial Pool Elev:	378.00 ft
Initial Pool:	26.19 ac-ft

Emergency Spillway

Spillway Elev	Crest Length (ft)	Left Sideslope	Right Sideslope	Bottom Width (ft)
378.00	20.00	3.00:1	3.00:1	13.00

Pond Results:

Peak Elevation:	379.57 ft
Dewater Time:	0.78 days

*Dewatering time is calculated from peak stage to lowest spillway***Elevation-Capacity-Discharge Table**

Elevation	Area (ac)	Capacity (ac-ft)	Discharge (cfs)	Dewater Time (hrs)
372.00	3.760	0.000	0.000	
373.00	3.955	3.857	0.000	
374.00	4.154	7.911	0.000	
375.00	4.358	12.167	0.000	
376.00	4.567	16.629	0.000	
377.00	4.781	21.303	0.000	
378.00	5.000	26.193	0.000	Spillway #1
379.00	5.200	31.293	33.646	16.80
379.57	5.316	34.291	85.165	1.80 Peak Stage
380.00	5.404	36.594	124.724	
381.00	5.611	42.101	272.835	
382.00	5.823	47.818	480.743	
383.00	6.038	53.748	753.192	
384.00	6.257	59.895	1,094.864	
385.00	6.480	66.263	1,510.219	

Detailed Discharge Table

SEDCAD 4 for Windows

Copyright 1998 - 2010 Pamela L. Schwab

Elevation (ft)	Emergency Spillway (cfs)	Combined Total Discharge (cfs)
372.00	0.000	0.000
373.00	0.000	0.000
374.00	0.000	0.000
375.00	0.000	0.000
376.00	0.000	0.000
377.00	0.000	0.000
378.00	0.000	0.000
379.00	33.646	33.646
380.00	124.724	124.724
381.00	272.835	272.835
382.00	480.743	480.743
383.00	753.192	753.192
384.00	1,094.864	1,094.864
385.00	1,510.219	1,510.219

SEDCAD 4 for Windows

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Subwatershed Hydrology Detail:

Stru #	SWS #	SWS Area (ac)	Time of Conc (hrs)	Musk K (hrs)	Musk X	Curve Number	UHS	Peak Discharge (cfs)	Runoff Volume (ac-ft)
#1	1	142.000	0.414	0.000	0.000	82.000	M	222.52	19.231
Σ		142.000						222.52	19.231

Subwatershed Time of Concentration Details:

Stru #	SWS #	Land Flow Condition	Slope (%)	Vert. Dist. (ft)	Horiz. Dist. (ft)	Velocity (fps)	Time (hrs)
#1	1	3. Short grass pasture	3.20	16.00	500.00	1.430	0.097
		8. Large gullies, diversions, and low flowing streams	1.29	50.00	3,881.00	3.400	0.317
#1	1	Time of Concentration:					0.414

Sediment Basin Design Summary

24-Aug-17

I. General Information

Mine: Seven Hills Mine, Permit #357
 Basin: SB 001

Basin Type: Incised
 Examination Exempt: Yes

II. Design Parameters:

Design Storm Event : (10yr/24hr)	R=	4.50	
Runoff Area (RA) (Treatment and Detention)	RA =	142.00	
Runoff Curve Number:	CN =	80	
Unitless number	$S = ((1000)/CN) - 10 =$	2.50	
Runoff (Q) - Watershed Inches	$Q = ((P - 0.2S)^2) / (P + 0.8S) =$	2.46	
Runoff Coefficient (RC)	$RC = Q / R =$	0.55	0.547008547

III. Runoff Calculation:

$$RV = Q \text{ (in / 24hr)} * 1 \text{ ft/12 in} * \text{Runoff Area (ac)} * 43,560 \text{ sq ft / ac}$$

Where: RV = runoff volume (cubic ft/24hr)
 Q = runoff design event (inches/24hr)

RV = 1,268,825 cubic ft /24hr 29.13 acre ft

IV. Treatment Volume Calculation:

Detention Time: DT	10 hours	
Sediment Volume: SV	127927 cubic ft	
Pit Pumpage Volume: PV	1000 gpm	
Design Sediment Storage: SV (see USLE Calculations attached)	127927 cubic ft	2.94 acre ft

$$MCV = RV \text{ cf / 24hr} * 1 \text{ day/24hr} * DT \text{ hr} + PV \text{ gpm} * 1440 \text{ min/day} * 1 \text{ day/24hr} * 0.1337 \text{ cf/gal} * DT \text{ hr} + SV \text{ cf}$$

Minimum Compliance volume= 736,824 cubic ft 16.92 acre ft

Basin Freeboard:	2.0 ft minimum at pool	
Basin Surface area:	5.00 acres	217800 sq ft
Basin Minimum Average depth	3.38 ft	

Sediment Basin Design: Universal Soil Loss Calculation:

24-Aug-17

Mine: Seven Hills Mine, Permit #357**Basin:** SB 001**Soil Loss per Unit Area:**

$$A = R * K * LS * CP$$

$$A = 54.05 \text{ tons/acre}$$

where: A = Soil loss per acre (tons/acre)

R = Rainfall-Erosivity Factor

200

K = Soil Erodibility Factor

0.43

LS = Length Slope Factor

1.98

CP = Cropping Practice Factor

0.32

LS Factor Calculation

$$LS = (FSL/72.6)^m * ((430x^2 + 30x + 0.43) / 6.613)$$

1.98

where: FSL = Field Slope Length

730.00

x = Field Slope Ratio

0.0641

m = slope factor

0.5

slope < 3% m=0.3 , = 4% m=0.4, >5% m=0.5

CP Weighted Factor Calculation

Ground Cover Description	CP Value	Area (ac)	CP*ac
Active Disturbed area	0.90	40.00	36.00
Reclaimed or Undisturbed	0.09	102.00	9.18
		142.00	45.18
			0.32 Weighted CP

Sediment Delivery Ratio:

$$D = Da * Dv * Dc * Dp$$

$$D = 0.25$$

where: D = sediment delivery ratio

Da = area delivery ratio

0.50

Dv = Vegetation trapping factor

1.00

Dc = Channelization factor

0.50

Dp = pit deposition factor

1.00

Sediment Yield From Design Watershed:

$$Y = A * D$$

$$Y = 13.51 \text{ tons/acre}$$

where: Y = Watershed Sediment Yield (Tons / Acre)

A = Soil loss per area (Tons / Acre)

D = Sediment Delivery Ratio

Life of Basin 3.0 years

Sediment Yield Conversion Ac ft / ac year:

$$Y2 \text{ (ac ft / ac yr)} = (Y \text{ t/ac} * 2000 \text{ lb/t}) / (90 \text{ lb/cubic ft} * 43560 \text{ sq ft / ac})$$

$$Y2 = 0.00689 \text{ ac ft / ac yr}$$

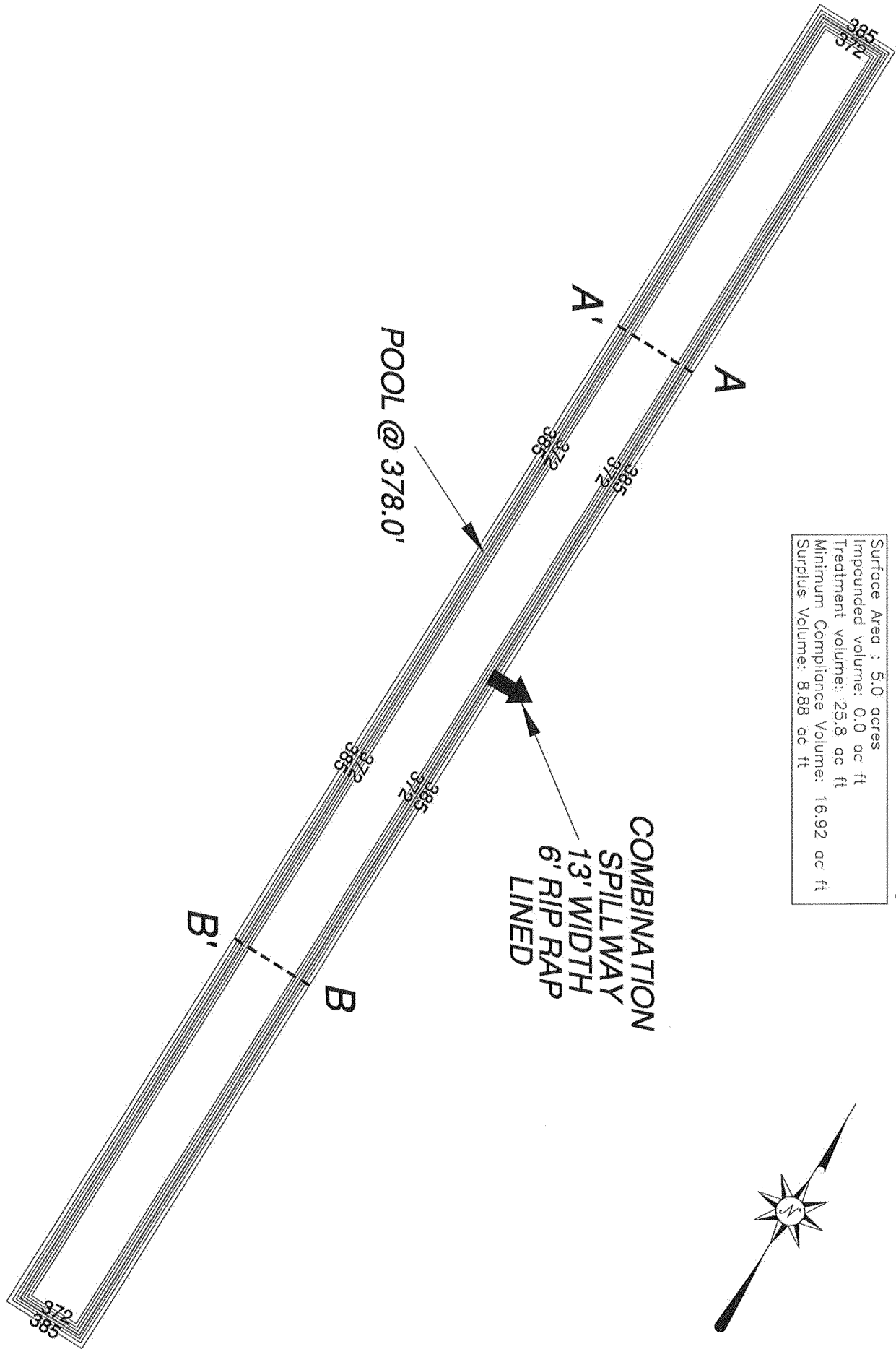
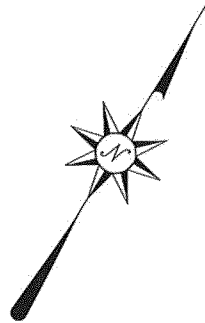
Sediment Storage Calculation:

$$SL = RA * Y2 * YR * 43560 \text{ Design Sediment Storage} =$$

127927	cubic ft
2.94	Ac/ft

SB 001, Volume Summary

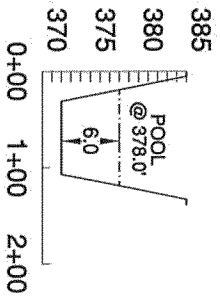
Surface Area :	5.0 acres
Impounded volume:	0.0 ac ft
Treatment volume:	25.8 ac ft
Minimum Compliance Volume:	16.92 ac ft
Surplus Volume:	8.88 ac ft



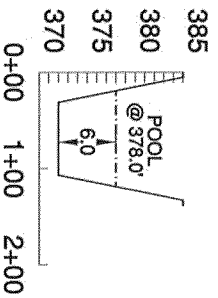
HOR. 1" = 200'

UMILLC 566 Dickeyville Road, Lynnville IN Sediment Control Basin SB 001 Plan View Seven Hills Mine, Permit S-357		DATE: 8-16-2017	REVISION NO.:	DATE:
SCALE: 1 in = 200 ft		NOTES:		
SHEET 1 OF 2				

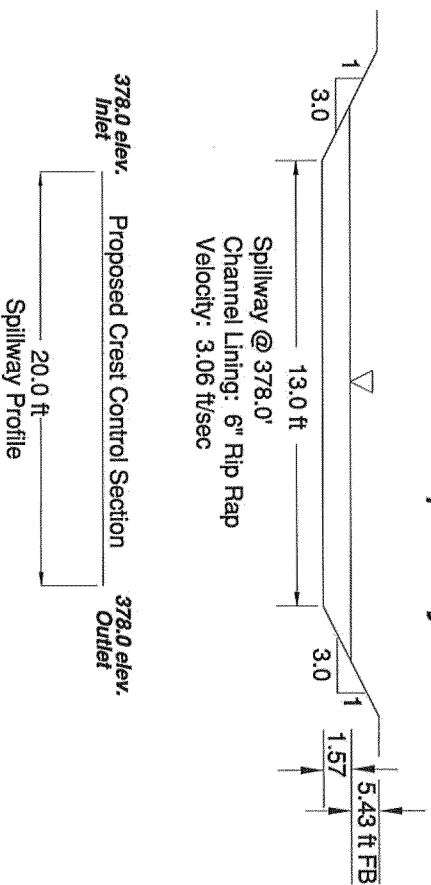
Cross-section A - A'



Cross-section B - B'



Combination Spillway

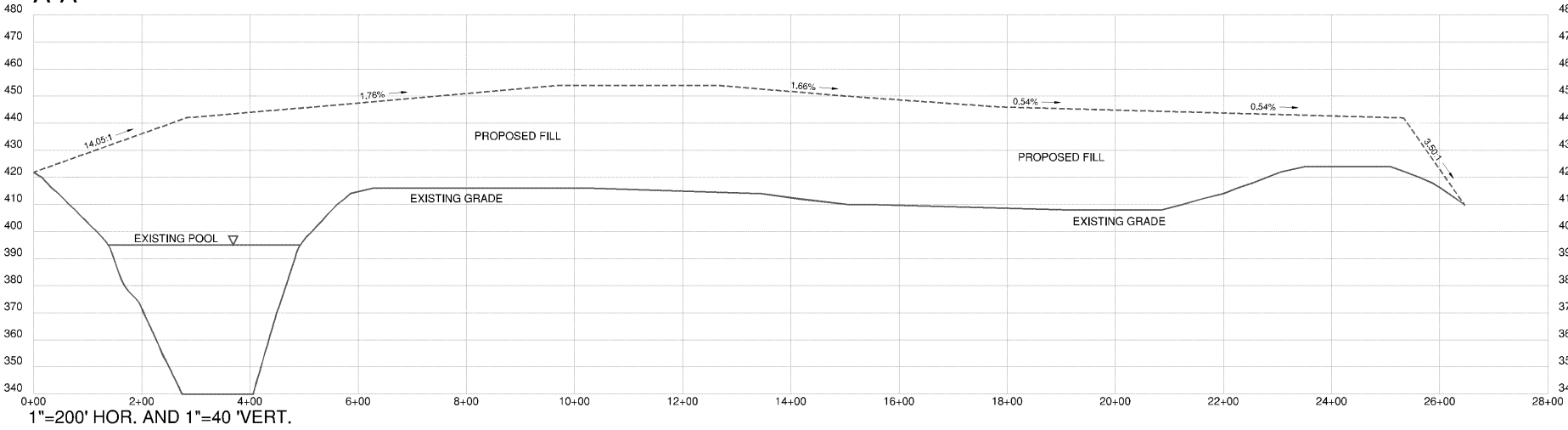


UMI, LLC
Lynnville, Indiana

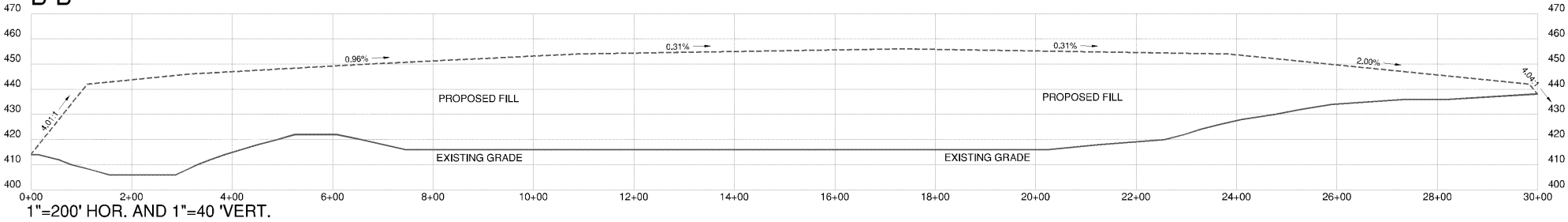
Spoil Disposal Area
Proposed Cross-Sections A-A' and B-B'
Seven Hills Mine
Permit #S-357

DATE: 8-23-2017	REVISION NO.	DATE
ENGINEER:		
TECH:		
SCALE: AS-NOTED	NOTES:	

A-A'



B-B'





United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

September 22, 2017

Ms. Lee Anne Devine
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

UNITED MINERALS COMPANY, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
U.S. Army Corps of Engineers Project No. LRL-2013-635-gjd
Conditional Permit Approval

Dear Ms. Devine:

Please accept this letter as formal documentation of our proposal to include a permit condition on the above referenced application. This proposal was provided in an email sent to Colonel Gant by Kemal Williamson on September 1, 2017. As you are aware, prior to our meeting August 31, 2017 in Louisville we reevaluated the mining plan and significantly reduced the wetland impacts by an additional 144 acres. This change has been made with the intent of being able to move the permit forward with a robust Environmental Assessment. Sound scientific and engineering analysis, as well as, numerous past mining examples have been provided that demonstrate significant negative impacts to the adjacent wetlands are not expected.

In addition to the significant reduction in impacts and supporting analysis, an additional 140 acres of wetlands on the north end of the mining reserve has been identified and proposed for a restricted "Conditional" approval. This will reduce the wetlands initially proposed for impacts to approximately 200 acres and provide 4-5 years of mining at a 1M tons/year rate. During that time, the Corps can closely monitor whether or not significant indirect impacts occur and our performance on reclamation and mitigation. If the indirect impacts are significant and/or we are not performing the mitigation as required then the permit "Condition" is not met. As a result, Peabody is not allowed to continue mining into the 140 acres of wetlands shown on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and we can continue mining the adjacent 140 acres. An appropriate Adaptive Management Plan can be established to monitor for indirect impacts.

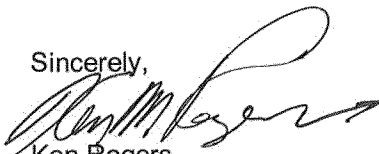
We believe the 'conditional approach' is very reasonable and should alleviate remaining concerns. Permit conditions are common practice in most all permits required for coal mining and are effective in addressing issues such as this.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
"Conditional" Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

If you have any questions or comments, I can be reached at **812.922.1044** or via email at **<Krogers@peabodyenergy.com>**. We look forward to continue working with you and others on this important project.

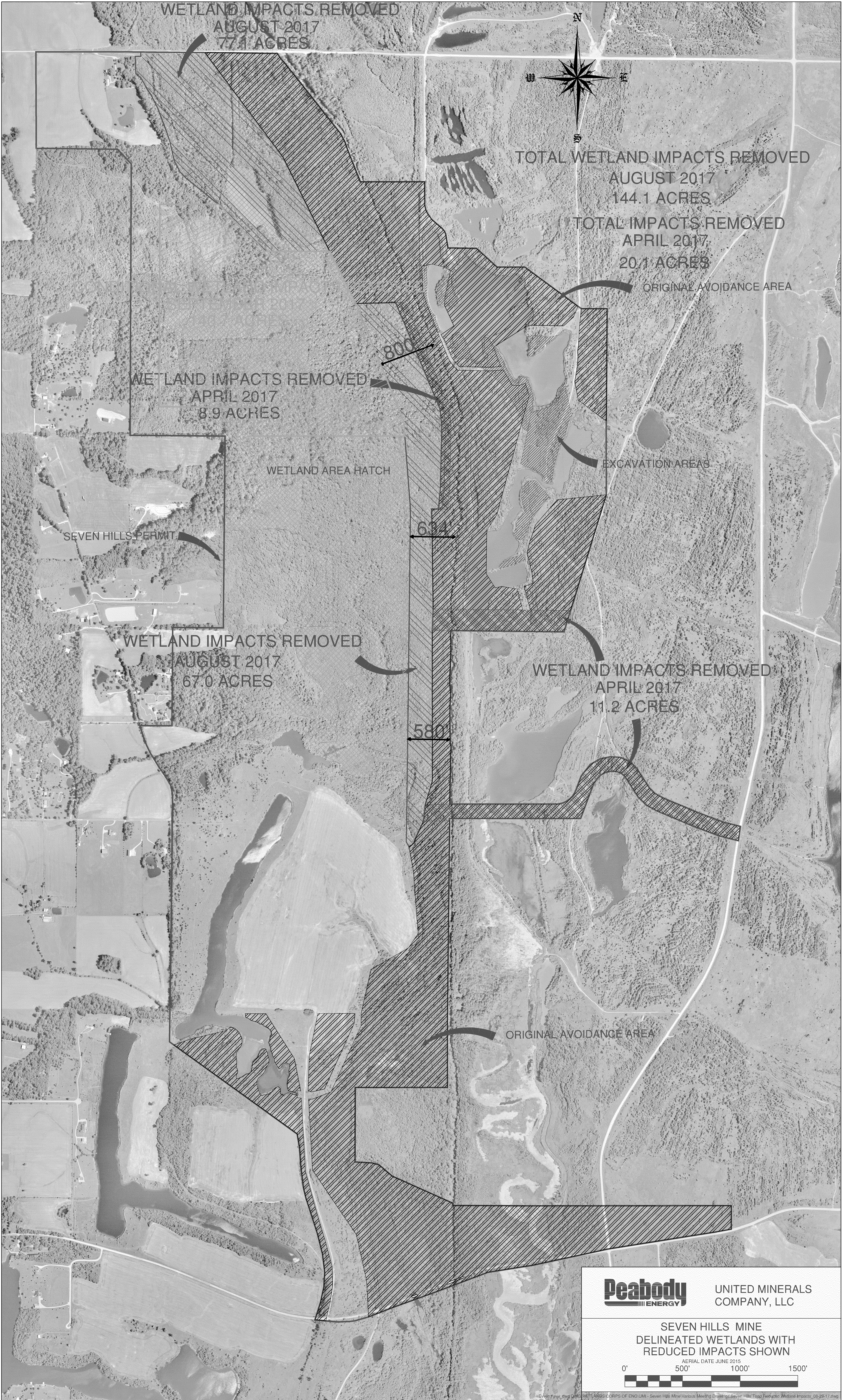
Sincerely,



Ken Rogers
Director Environmental Services
Authorized Representative

Enclosures

cc: Seven Hills Mine - Permit Binder (1x)





WETLAND IMPACTS REMOVED
AUGUST 2017
77.1 ACRES

TOTAL WETLAND IMPACTS REMOVED
AUGUST 2017
144.1 ACRES

TOTAL IMPACTS REMOVED
APRIL 2017
20.1 ACRES

ORIGINAL AVOIDANCE AREA

WETLAND IMPACTS REMOVED
APRIL 2017
8.9 ACRES

WETLAND AREA HATCH

EXCAVATION AREAS

SEVEN HILLS PERMIT

WETLAND IMPACTS REMOVED
AUGUST 2017
67.0 ACRES

WETLAND IMPACTS REMOVED
APRIL 2017
11.2 ACRES

ORIGINAL AVOIDANCE AREA

Peabody
ENERGY

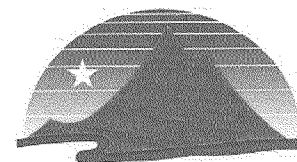
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5'8'0L *+.5L /+0'

&' .+0'#6'&L 9'6.#0&5L 9+6*L
4'&7%'&L +/2#/65L 5*190
#4#&L 846'L .70' 911+
1 0 111 0 1111 0 1111 0



August 25, 2017

Mr. Mike Engleman
United Minerals Company, LLC
566 Dickeyville Road
Lynnville, IN 47619



BUCKRIDGE

Environmental
Engineering, Inc.

Engineers/Scientists

RE: Seven Hills Pit - Pigeon Creek Levee
Construction in Floodway Application
(Buckridge Project No. 16-21)

8344 Susan Court
Newburgh, IN 47630-3248
Telephone (812) 858-9970
Facsimile (812) 858-9985

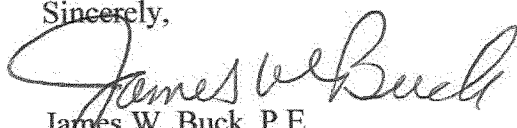
Dear Mike:

Per your request, enclosed is a revised copy of the final report documenting the results of the hydrologic and hydraulic analyses related to the proposed construction of a flood protection levee and other mine related structures in the floodplain of Pigeon Creek at the proposed Seven Hills Pit in Warrick County, Indiana. The report has been revised to reflect modifications made in the HEC-RES model to incorporate the new Seven Hills Road Bridge, recent changes in the proposed mining area, relocation of the levee and construction of the levee as a single unit, and to allow the placement of excavated spoil material east of the creek in existing open-water impoundments adjacent to the cut areas. The report includes information to address comments from the Corps of Engineers. I have labeled the report as Attachment VI.B.2.e., Item D. for incorporation into the IDNR surface coal mining permit application document. Included is the original copy of the report and maps for your use in preparing the necessary copies for submittal to the various regulatory agencies. If you need additional copies of the report or maps, please let me know and I can furnish them when requested.

As we previously discussed, construction of the levee at the location shown on the cross-section map will require the excavation of spoil and removal of levee remnants on the east side of Pigeon Creek to restore effective flow through the floodway. The areas where excavation is required are shown on the cross-section location map. The analyses indicate increases in flood levels exceed 0.14 feet in areas adjacent to and upstream of the proposed levee system. IDNR rules prohibit increases greater than 0.14 feet on uncontrolled property unless flood easements are obtained for the impacted properties. Therefore, you will need to submit copies of the executed flood easements for the uncontrolled properties involved when the permit modification is filed with IDNR.

I appreciate the opportunity to have been of assistance to you on this project. Should you have any questions concerning the analyses, report or need additional information, please contact me at the letterhead address or telephone number.

Sincerely,


James W. Buck, P.E.
President

Enclosures (1) – Seven Hills Mine Pigeon Creek HEC-RAS Analysis Report (Revised 8-25-17)

**United Minerals Company LLC – Seven Hills Mine
Analysis of Impacts to Flood Levels along Pigeon Creek Floodway**

1.0 Introduction

United Minerals Company LLC (UMC) is proposing to develop a surface coal mining operation in Warrick County, Indiana known as the Seven Hills Pit. Development of the mining operation will involve the construction of facilities, including the construction of a levee, drainage control structures, the excavation of pits for coal recovery, stockpiling of soil and placement of spoil from the mining operation within the flood plain of Pigeon Creek. The watershed of Pigeon Creek at the project site is approximately 200 square miles. Therefore, approval for Construction in a Floodway from the Indiana Department of Natural Resources (IDNR) is required for the project. For coal mining related projects, the IDNR Division of Reclamation reviews floodway impacts as part of the review for surface coal mining permit applications.

Buckridge Environmental Engineering, Inc. of Newburgh, Indiana, was retained by United Minerals Company, LLC to prepare the engineering studies and perform hydraulic modeling for the project as required by IDNR for approval of construction in a floodway. The modeling was originally performed in 2006. The IDNR issued United Minerals coal mining permit S-357 in March, 2014 for mining in the Seven Hills Pit area. However, at the time of the original modeling, the portion of Seven Hills Road located along the north side of the S-357 mining area had been closed to traffic for many years and the original iron-truss bridge across Pigeon Creek had been removed. Subsequently, the Warrick County Highway Department reconstructed Seven Hills Road and constructed a new multi-span, pre-stressed concrete bridge across Pigeon Creek with elevated roadway approaches. Consequently, the original Hec-Ras modeling did not reflect the presence of either the original bridge or the new bridge for Seven Hills Road. The Hec-Ras model of the project has been updated to reflect construction of the new Seven Hills Road bridge, recent changes in the proposed mining area, relocation of the levee and construction of the levee as a single unit, and to allow the placement of excavated spoil in the adjacent ponds to create potential wetland mitigation areas on the east side of Pigeon Creek.

This report has been prepared to document the methods, procedures and assumptions used in completing the required hydrologic and hydraulic modeling. The report was developed to be part of and to supplement the information contained in the IDNR Surface Coal Mining Permit Application. The major topics discussed in this report include discussions of project location, project description, a description of the Pigeon Creek watershed, design criteria, and methods used in the hydrologic and hydraulic analyses. The Results of Hydraulic Analyses section provides comparisons between the existing flooding conditions and the projected effects of the mining activities on flood levels. Table 1 presents the results of the HEC-RAS computer modeling of the projected impacts on flood levels due to the proposed construction. The project drawings, HEC-RAS computer program output, and typical cross-sections are presented at the end of this attachment.

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the previous mining activity currently restricts flow at several locations. In addition, the remnants of levees previously constructed to protect the earlier mining operations remain along portions of the stream.

The spoil piles and levee remnants inhibit effective flow through certain areas on the east side of the creek. To remove the flow restrictions and reestablish effective flow through the flood plain, it is proposed to remove some spoil piles and the levee remnant in certain areas opposite the proposed levee. The excavated spoil material and levee fill will be pushed into the existing impoundments adjacent to the proposed excavation areas for disposal. For the HEC-RAS model, it was assumed the proposed excavation will lower the areas within the excavation limits to a uniform elevation of 390 feet MSL. The areas of spoil and levee remnants to be removed are shown on the HEC-RAS Cross-Section Location Map. A typical cross-section showing the final configuration of the excavation areas after the spoil removal is shown in Figure 3.

4.0 Pigeon Creek Watershed Characteristics

As indicated above, the watershed of Pigeon Creek at the project site is approximately 200 square miles. The project site is located in southern Indiana in the physiographic region of Indiana known as the Wabash Lowland. The Wabash Lowland is unglaciated and the topography includes rugged uplands, gentle rolling hills, and broad flat lacustrine plains punctuated with isolated valley braid core hills. During the last glacial period (Wisconsin), major streams in southern Indiana carried such a great load of outwash that their valleys became heavily aggraded. The Ohio River system was a major sluiceway for transporting the sediment laden runoff as the glaciers retreated. Consequently, many of the tributary streams were partially blocked and water was impounded upstream of their mouths. Thick beds of lacustrine (lake) clay and silt were deposited in these lakes and slack water areas. The lower Pigeon Creek valley is a good example of such lake areas.

The watershed size within the study reach varies from approximately 191 square miles at the upstream end at the I-64 crossing and approximately 208 square miles at the downstream limits near the Boonville-New Harmony Road bridge (USGS, Stream Stats, Beta Version 3). The "Coordinated Discharge Graph" for Pigeon Creek published by the IDNR - Division of Water is included in Figure 4. Based on the coordinated discharge graph, the projected 100-year frequency discharge within the project area varies from approximately 10,700 cfs at the upstream end to 11,200 cfs at the downstream end of the study reach.

5.0 Design Criteria and Procedures

Construction of the proposed levee and mining activity along Pigeon Creek is considered to be construction in the floodway and regulated under the Indiana Flood Control Act (IC 14-28). The following criteria were developed for this project and used in developing the HEC-RAS model:

- 1) The baseline condition against which the effects of the proposed construction activity will be compared is the existing flood plain configuration and the original Seven Hills Road bridge;
- 2) The encroachments caused by construction of the levee and mining activity shall be designed to safely pass the estimated peak discharge from the 100-year flood event without causing an increase in the

computed flood elevation of greater than 0.14 feet on property not owned or leased by the applicant and on property for which the applicant has not obtained flood easements;

- 3) The effects on flood elevations of the proposed construction will be modeled using the Corp of Engineers' HEC-RAS computer program;
- 4) The entire levee will be constructed as a single unit prior to mining in the floodplain and removed upon the completion of reclamation and stabilization of the mining are in the floodplain;
- 5) Mined areas will be returned to the original grade by hauling all boxcut and excess spoil to upland disposal areas; and
- 6) Prior to construction of the levee, the spoil piles and levee remnant on the east side of Pigeon Creek will be removed to increase the effective flow area of the flood plain.

6.0 Methodology Used in Hydraulic Analyses

The U.S. Army Corps of Engineers' *HEC-RAS River Analysis System* computer program (Version 3.1.3, May, 2005) was used to determine water surface profiles for the 100-year flood event on Pigeon Creek for the base, existing and proposed conditions. The HEC-RAS program is based on the methods used in the Corps of Engineers' HEC-2 model and is a generally accepted method for calculating water surface profiles for gradually varied flow in natural or man-made channels. The computational procedure is based on the solution of the one-dimensional energy equation with energy loss due to friction evaluated using Manning's equation. This computational procedure is generally known as the Standard Step Method. Input parameters include stream geometry and reach information, design flow information, and channel and flood plain roughness characteristics.

Flood plain cross-section geometry was developed from topographic maps (2 feet contour interval) provided by United Minerals. The topographic maps were prepared from aerial photos taken in 2005 using photogrammetric methods. The stream channel geometry and the immediate overbank elevations within approximately 100 feet of the top of bank were determined from field surveys conducted by United Minerals using GPS surveying equipment. The surveyed cross-sections were spaced approximately 500 to 1,000 feet apart. The cross-sections along the stream were selected at locations representative of the stream reach being modeled. Geometry of the three (3) county road bridge structures were obtained from field measurements taken of the existing bridge structures by UMC. Details of the I-64 bridges were obtained from plans of the existing bridge structures provided by IDOT except that the bounding cross-sections and roadway elevations were obtained from the digital 2-foot topo maps. The locations of the stream cross-sections used in the hydraulic model of the Pigeon Creek flood plain are shown on the HEC-RAS Cross-Section Location Map included at the end of this report.

Stream channel and overbank roughness parameters were determined from field reconnaissance and review of recent aerial photographs to assess vegetation types and patterns. Manning's "n" values used in the model were selected from the ranges of published values contained in Table 3.1 of the *HEC-RAS Hydraulic Reference Manual* (U.S. Army Corps of Engineers, April, 1997). The main channel of Pigeon

Creek is generally straight with a uniform cross-section. The channel bottom substrate consists of silt, sand and gravel. The bottom and sides below the ordinary high water mark are generally clear of vegetation. The banks above the OHW mark are generally weedy with brush. An “n” value of 0.035 was selected for the channel section of the river. Vegetation in the overbank areas generally consists of forest with some interspersed areas of scrub-shrub wetlands with shallow water ponds resulting from past mining activity. The forested areas generally consist of mature stands of timber with undergrowth and flow into the branches. A roughness value of 0.12 was selected for the forested areas. The scrub-shrub areas consist of scattered brush and heavy weeds. An “n” value of 0.065 was selected for wetland areas. The shallow water ponds are irregular in shape and have aquatic vegetation around the edges and many have standing timber within the impounded area. An “n” value of 0.045 was selected for pond areas. Also, the flood plain area includes remnant segments of old stream channels. These channels have heavy vegetation with some blockage. An “n” value of 0.055 was selected for remnant channels.

The HEC-RAS flood model of approximately 32,000 feet of Pigeon Creek was developed to estimate the anticipated flooding conditions for the existing and proposed conditions. A total of forty-five (45) cross-sections were generated in the study area at locations necessary to adequately model the stream system. The HEC-RAS models were started approximately 7,800 feet downstream of the southern end of the proposed levee or about 1,600 feet downstream of the Boonville-New Harmony Road Bridge to account for the constriction caused by the bridge and road fill. The upstream limit for this study was approximately 400 feet upstream (north) of the westbound Interstate 64 Bridge over Pigeon Creek. Contraction and expansion coefficients of 0.1 and 0.3, respectively, were specified to model transition of flows at constrictions. The normal depth option was selected for the starting elevation at the downstream end of the study reach.

7.0 Results of Hydraulic Analyses

7.1 IDNR Construction in Floodway Permit

An initial run of the HEC-RAS model was performed for the base conditions (existing flood plain configuration and original Seven Hills Road Bridge) using the 100-year flood event to establish the basis for comparison of the impacts of constructing the levee system. Evaluations of the impacts caused by construction of the levee and mining activity were determined. The results of the HEC-RAS computer model of the studied reach of Pigeon Creek during the 100-year flood for the levee system are presented in Table 1 at the end of this report. The levee system resulted in a maximum increase in the flood levels of 1.28 feet at Station 166+43 during the mining operation. The computed differences in flood elevations decrease in the upstream direction due to the slope of the stream channel and overbank storage of the flood plain. The maximum computed increase at the Seven Hills Road Bridge (Station 194+28) was 1.02 feet. The maximum computed increase at the Stanley Road Bridge (Station 265+32) is 0.20 feet. Near the upstream end of the study area just downstream of the eastbound I-64 bridge crossing, the computed maximum increase at river station 312+45 is only 0.10 feet. The maximum computed increase at the upstream side of the bridge for westbound I-64 (Station 318+03) was only 0.06 feet.

Since the computed increases in flood levels within the inundated area are greater than 0.14 feet, flood easements for the impacted properties must be obtained by United Minerals Company. The approximate extent of areas inundated by the 100-year flood during mining are shown on the Cross-Section Location Map. The following table summarizes and compares the results of the hydraulic models for the levee at critical locations during the 100-year flood:

United Minerals Company LLC – Seven Hills Pit – IDNR Permit S-357
Pigeon Cr. Levee System – Revised Levee Locations and Spoil Excavation
Comparison of Computed Increase in 100-Year Flood Levels at Critical Locations

Analysis Condition	Increase (ft.) at Seven Hills (Station 194+28)	Increase (ft.) at Stanley Road (Station 265+32)	Increase (ft.) at D/S side I-64 (Station 312+45)	Comments
Base – Original Seven Hills Road	n/a	n/a	n/a	Original Seven Hills Road data from BLA Model with existing floodplain conditions
Existing Conditions New Seven Hills Rd	0.14	0.02	0.01	As-built Seven Hills Road & I-64 Bridges with existing floodplain conditions
Mining Levee	1.02	0.20	0.10	Levee in place with spoil excavation & levee removal east of Pigeon Cr.

7.2 Corps of Engineers Section 404 Permit

In addition to the construction in a floodway permit, the proposed mining activity also requires a Section 404 permit from the Corps of Engineers for impacts to wetlands and other jurisdictional waters of the U.S. The IDNR Floodplain Management Rules specify the 100-year flood as the regulatory flood event for the assessment of potential adverse impacts resulting from proposed activities in the floodway of rivers and streams. Although such an event is often misconstrued as only occurring once every one hundred years, statistically it is the flood event that has a one-percent chance of occurring in any given year. Thus, by its definition, this is a very rare event and likely will not occur during the expected life of the proposed mining operation. Since the 100-year flood is a very rare event and the estimated life of the mining operation is only approximately eight (8) years, the HEC-RAS model was used to evaluate the potential impacts that might occur during the 10-year flood event. Such an event is more likely to occur during the life of the operation when the temporary levee is in place.

An initial run of the HEC-RAS model was performed for the existing flood plain configuration and new Seven Hills Road Bridge using the 10-year flood event to establish the basis for comparison of the impacts caused by construction of the levee and mining activity. The existing floodplain conditions were used since the existing functions and values of the aquatic resources and terrestrial habitat are the basis for comparison of potential impacts. The results of the HEC-RAS computer model of the studied reach of Pigeon Creek during the 10-year flood for the levee system are presented in Table 2 at the end of this report. The results of the HEC-RAS model indicate the computed flood elevations during the 10-year flood are approximately 2+ feet lower than the 100-year flood through the study reach. However, comparison of the computed water surface top widths at any given cross-section shows only a very small increase in the top width between the two flood events. This indicates that the entire floodplain from valley-wall to valley-wall is being inundated during the more frequent flood events and that there is very little increase in the lateral extent of flooding during the more severe events. Likewise, the effect of the levee construction showed similar results; i.e. increases in flood depth but very little increase in the lateral extent of flooding during the 10-year event. Thus, there would be only minor indirect impacts to the aquatic resources and terrestrial habit in the vicinity of the project.

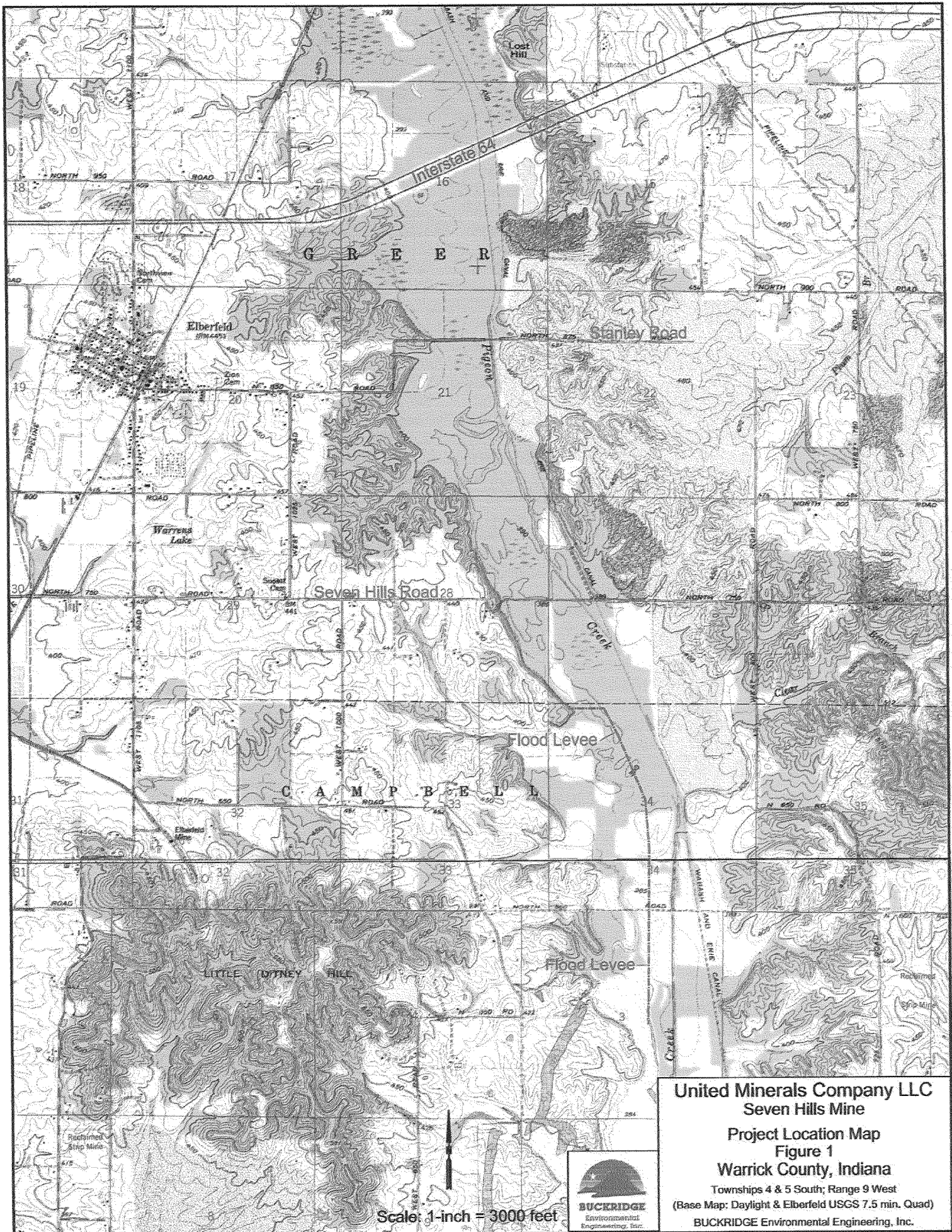
Construction of the levee will result in the temporary loss of flood storage due to isolating the floodplain areas protected by the levee. However, this temporary loss is offset by the increase in storage created by reestablishing the floodplain along the east side of the creek and increases in flood storage upstream of the project resulting from backwater flooding in floodplain areas already subject to inundation. Thus, the loss of the storage due to construction of the levee will not result in a decrease in flood retention or an increase in the potential for additional flooding downstream of the project area. In addition, the increases in flood water depth and storage upstream of the project area results in a commensurate decrease in the flow velocity through the overbank areas. This reduction in flow velocity will enable more sediment deposition in the overbank areas thus improving water quality and allowing nutrient cycling.

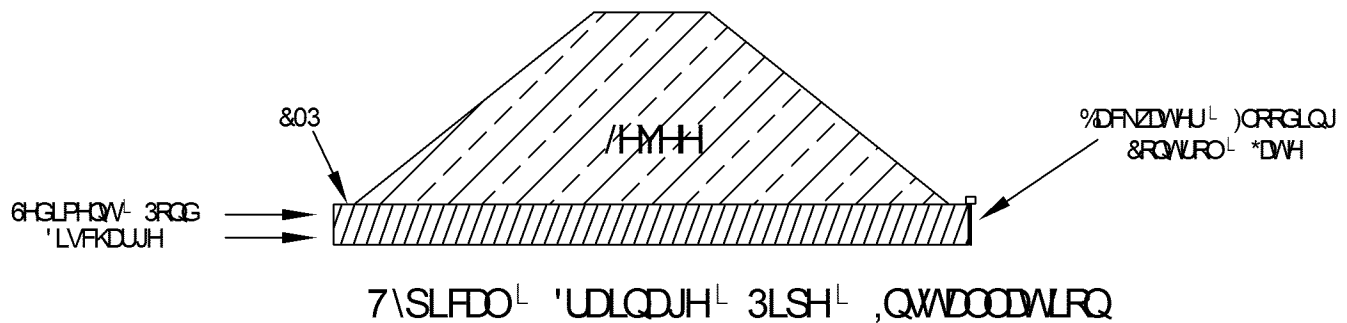
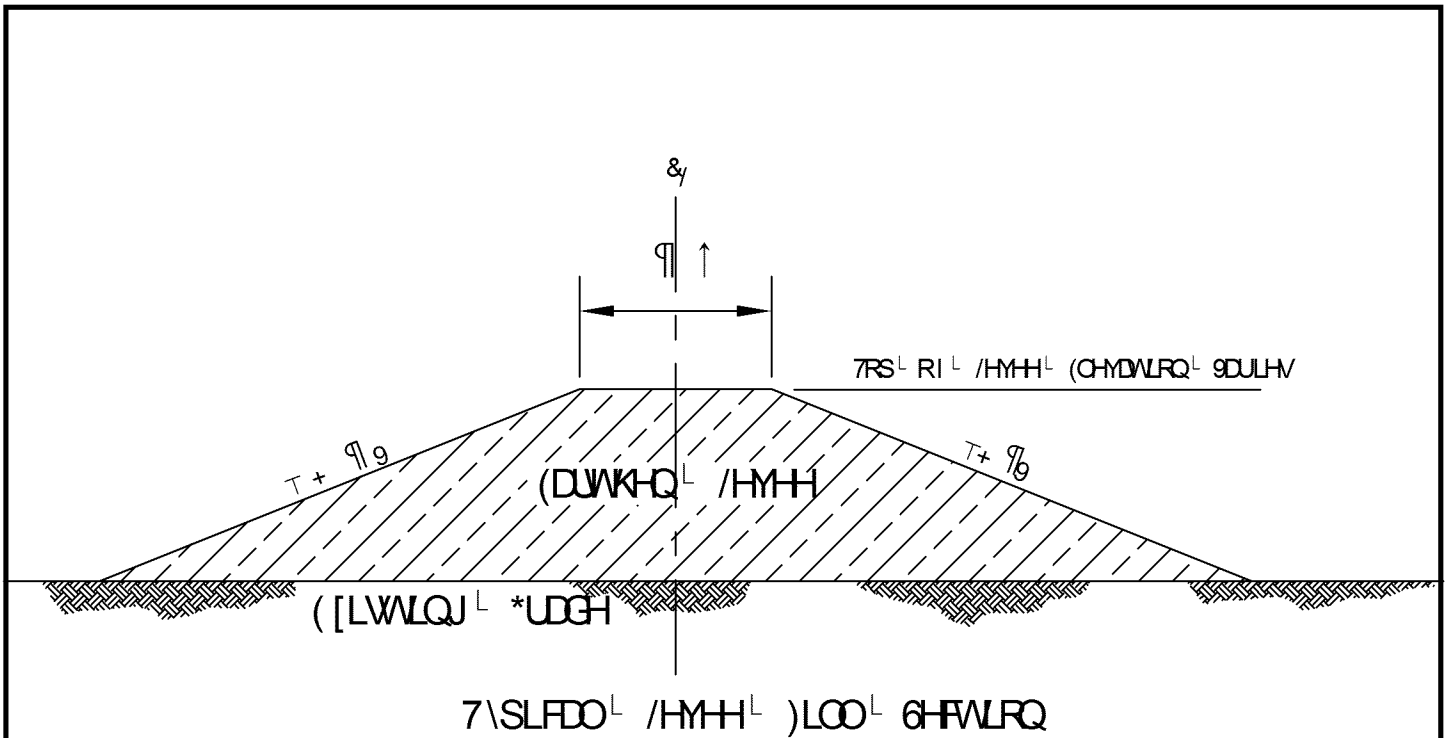
The HEC-RAS model shows increases in the channel velocity for cross-sections in the vicinity of the levee. The largest computed velocity increase is at Station 135+76 where the channel velocity increased from 3.46 feet/sec to 4.85 feet/sec. This cross-section is adjacent to a large spoil pile on the east side of the creek that will not be removed. Channel velocities of less than 5 feet/sec are generally considered

non-erodible in earthen channels. The maximum computed velocities in the vicinity of the levee construction are less than the maximum permissible velocity. In addition, it should be pointed out that the computed channel velocities at some cross-section locations upstream of the project area near I-64 currently exceed the 5 feet/sec value under the existing base conditions and the banks in the area appear to be stable. Thus, significant erosion or instability of the channel banks are not anticipated due to construction of the levee system.

The proposed reestablishment of the floodplain east of the creek will allow floodwater to flow through areas presently isolated from the creek and permit the creation of wetlands with similar functions and values as the wetlands to be directly impacted by the mining operations. The partial filling of the existing open-water impoundments with spoil to reestablish flow east of the creek will retain some of the current functions while allowing the restoration of additional shallow-water and terrestrial habitat in this area. The floodplain reestablishment will provide habitat areas for the migration or relocation of the aquatic and terrestrial species directly impacted by the proposed mining operations. Furthermore, the size of the directly impacted area is negligible when considering the amount of aquatic and terrestrial habitat existing in the surrounding area as well as present in the entire Pigeon Creek watershed.

Another consideration is the frequency and duration of overbank flooding and the potential indirect impacts this may have on the vegetative species present in the wetland areas. An analysis of the flow statistics of the USGS gage on Pigeon Creek at US Highway 41 in Evansville, Indiana was undertaken to determine the flow duration of daily values recorded at the gage during the period of record. The watershed of Pigeon Creek at the gage is approximately 320 square miles while the drainage area at the project site is approximately 200 square miles. The flow duration information indicates the measured stream discharge values respond relatively quickly to the commencement and cessation of precipitation in the upstream watershed and long-duration flooding does not occur. The flow duration is the percentage of time that a particular flow value was exceeded during that time period. Based on this statistical analysis, the flow values corresponding to 0.5%, 1% and 2% of the time were estimated. On average during a calendar year, the 0.5% flow would be expected to be exceeded on about 1.8 days (0.005×365). Likewise, the 1% and 2% flow values would be expected on about 3.7 and 7 days per year, respectively. The Hec-Ras model was used to compute the flood elevations through the project area corresponding to the 0.5%, 1% and 2% flow values. The computed flood profiles were compared to the elevations of the left bank and right bank at the cross-section locations along the stream. This analysis showed the 2% flow is approximately the same elevation as the stream banks and would roughly correspond to the "bank full" value. The 1% and 0.5% values are both above the bank elevations indicating overbank flooding would occur. The Hec-Ras analyses indicates that overbank flooding through the project area would be expected to occur on approximately 2 to 7 days per year. The project is not expected to result in any significant increase in the frequency, duration or intensity of flooding. This frequency and duration of inundation would not result in any detrimental impacts on the existing vegetation nor result in loss of tree biomass.





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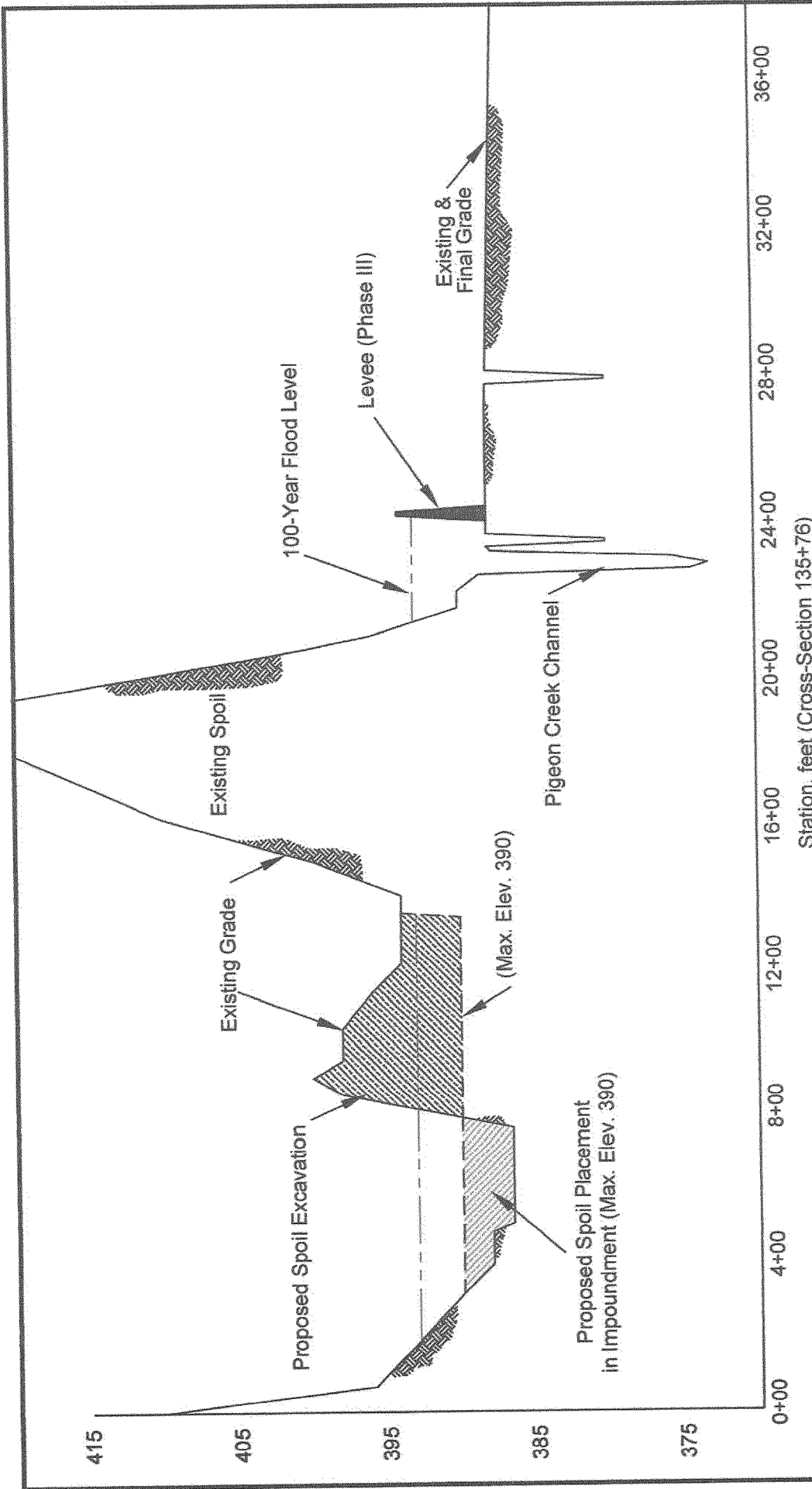
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BUCKRIDGE
Environmental
Engineering, Inc.



United Minerals Company, LLC

Seven Hills Pit

Proposed Flood Control Levee
Typical Cross-section
Spoil Removal East of Pigeon Creek

Figure 3

Attachment VI.B.2.e., Item D



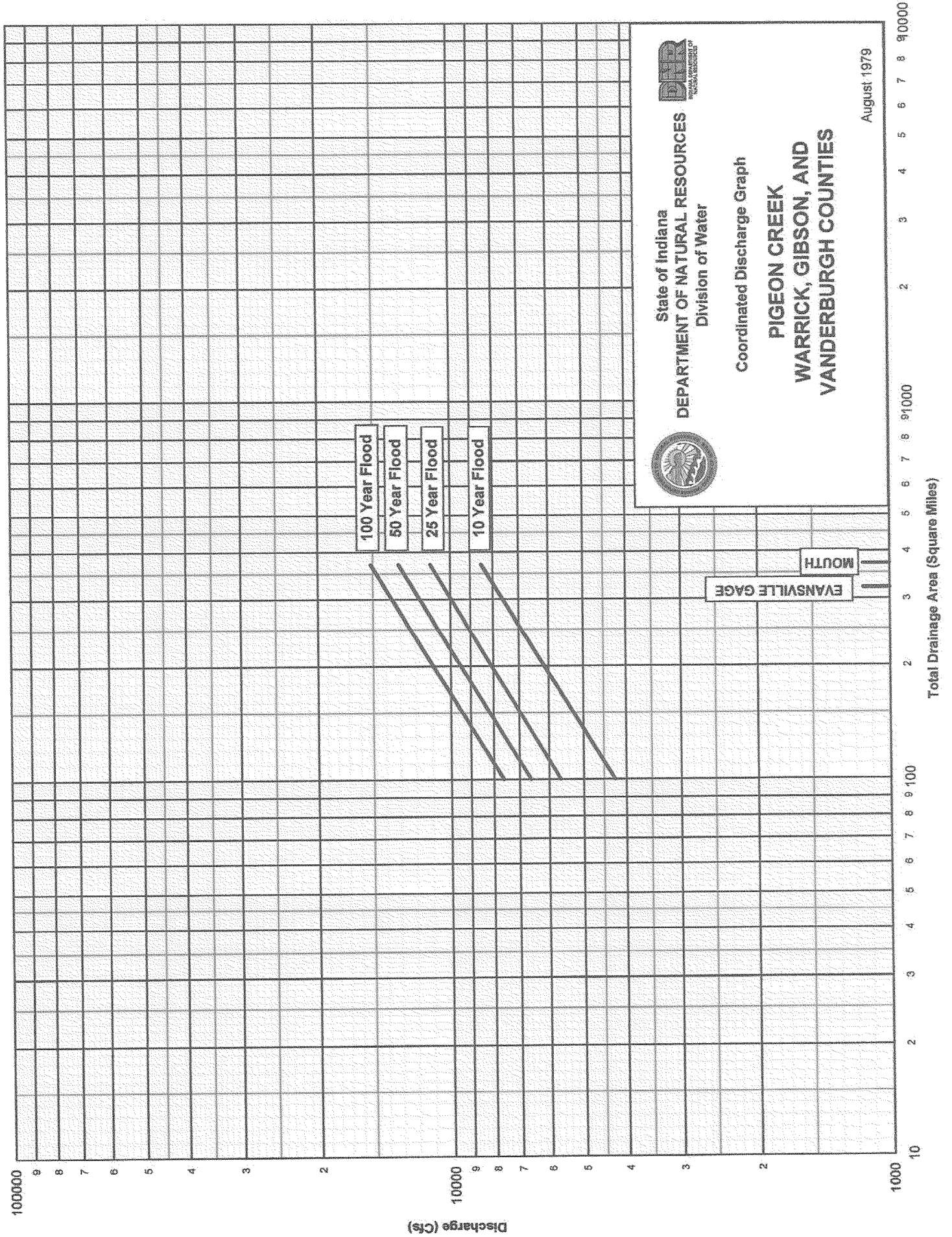


TABLE 1 - HEC-RAS River: Pigeon Creek Reach: Main Profile: 100-yr DNR (Permit S-357, Attachment VI.B.2.e. - Item D)													
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	0	100-yr DNR	Base-Orig 7H	11200	369.38	389.53	384.40	389.56	0.000127	2.80	16846.35	2559.07	0.12
Main	0	100-yr DNR	Base-New 7H	11200	369.38	389.53	384.40	389.56	0.000127	2.80	16846.35	2559.07	0.12
Main	0	100-yr DNR	Rev Levee+WL	11200	369.38	389.53	384.40	389.56	0.000127	2.80	16846.35	2559.07	0.12
Main	695	100-yr DNR	Base-Orig 7H	11200	369.48	389.61	384.15	389.63	0.000065	2.00	17942.63	2389.22	0.09
Main	695	100-yr DNR	Base-New 7H	11200	369.48	389.61	384.15	389.63	0.000065	2.00	17942.63	2389.22	0.09
Main	695	100-yr DNR	Rev Levee+WL	11200	369.48	389.61	384.15	389.63	0.000065	2.00	17942.63	2389.22	0.09
Main	1175	100-yr DNR	Base-Orig 7H	11200	369.54	389.64	384.72	389.67	0.000096	2.34	16579.73	2424.69	0.11
Main	1175	100-yr DNR	Base-New 7H	11200	369.54	389.64	384.72	389.67	0.000096	2.34	16579.73	2424.69	0.11
Main	1175	100-yr DNR	Rev Levee+WL	11200	369.54	389.64	384.72	389.67	0.000096	2.34	16579.73	2424.69	0.11
Main	1628	100-yr DNR	Base-Orig 7H	11200	369.60	389.68	382.39	389.72	0.000102	2.54	12781.79	2462.31	0.11
Main	1628	100-yr DNR	Base-New 7H	11200	369.60	389.68	382.39	389.72	0.000102	2.54	12781.79	2462.31	0.11
Main	1628	100-yr DNR	Rev Levee+WL	11200	369.60	389.68	382.39	389.72	0.000102	2.54	12781.79	2462.31	0.11
Main	1682			Mult Open									
Main	1735	100-yr DNR	Base-Orig 7H	11200	369.60	389.88	382.39	389.92	0.000095	2.48	13128.24	2465.63	0.11
Main	1735	100-yr DNR	Base-New 7H	11200	369.60	389.88	382.39	389.92	0.000095	2.48	13128.24	2465.63	0.11
Main	1735	100-yr DNR	Rev Levee+WL	11200	369.60	389.88	382.39	389.92	0.000095	2.48	13128.24	2465.63	0.11
Main	2155	100-yr DNR	Base-Orig 7H	11200	369.80	389.91	385.41	390.02	0.000298	4.18	10377.13	2595.93	0.19
Main	2155	100-yr DNR	Base-New 7H	11200	369.80	389.91	385.41	390.02	0.000298	4.18	10377.13	2595.93	0.19
Main	2155	100-yr DNR	Rev Levee+WL	11200	369.80	389.91	385.41	390.02	0.000298	4.18	10377.13	2595.93	0.19
Main	2623	100-yr DNR	Base-Orig 7H	10800	369.80	390.08	385.01	390.10	0.000103	2.52	18910.62	2718.77	0.11
Main	2623	100-yr DNR	Base-New 7H	10800	369.80	390.08	385.01	390.10	0.000103	2.52	18910.62	2718.77	0.11
Main	2623	100-yr DNR	Rev Levee+WL	10800	369.80	390.08	385.01	390.10	0.000103	2.52	18910.62	2718.77	0.11
Main	3142	100-yr DNR	Base-Orig 7H	10800	368.10	390.14	384.79	390.16	0.000085	2.20	21186.63	3019.32	0.10
Main	3142	100-yr DNR	Base-New 7H	10800	368.10	390.14	384.79	390.16	0.000085	2.20	21186.63	3019.32	0.10
Main	3142	100-yr DNR	Rev Levee+WL	10800	368.10	390.14	384.79	390.16	0.000085	2.20	21186.63	3019.32	0.10
Main	4061	100-yr DNR	Base-Orig 7H	10800	368.90	390.22		390.23	0.000084	2.16	21129.29	3193.87	0.10
Main	4061	100-yr DNR	Base-New 7H	10800	368.90	390.22		390.23	0.000084	2.16	21129.29	3193.87	0.10
Main	4061	100-yr DNR	Rev Levee+WL	10800	368.90	390.22		390.23	0.000084	2.16	21129.29	3193.87	0.10
Main	5153	100-yr DNR	Base-Orig 7H	10800	370.00	390.31		390.34	0.000102	2.29	16872.18	2610.70	0.11
Main	5153	100-yr DNR	Base-New 7H	10800	370.00	390.31		390.34	0.000102	2.29	16872.18	2610.70	0.11

Table 1 - Page 1

Main	5153	100-yr DNR	Rev Levee+W/L	10800	370.00	390.31	390.34	0.000102	2.29	16872.18	2610.70	0.11
Main	6203	100-yr DNR	Base-Orig 7H	10800	370.20	390.43	390.49	0.00018	3.18	12536.76	1901.56	0.14
Main	6203	100-yr DNR	Base-New 7H	10800	370.20	390.43	390.49	0.00018	3.18	12536.76	1901.56	0.14
Main	6203	100-yr DNR	Rev Levee+W/L	10800	370.20	390.43	390.49	0.00018	3.18	12536.76	1901.56	0.14
Main	7162	100-yr DNR	Base-Orig 7H	10800	371.20	390.59	390.62	0.00011	2.64	13544.58	2243.99	0.11
Main	7162	100-yr DNR	Base-New 7H	10800	371.20	390.59	390.62	0.00011	2.64	13544.58	2243.99	0.11
Main	7162	100-yr DNR	Rev Levee+W/L	10800	371.20	390.59	390.62	0.00011	2.64	13544.58	2243.99	0.11
Main	8198	100-yr DNR	Base-Orig 7H	10800	370.60	390.73	386.73	0.000201	3.18	10801.29	1904.90	0.15
Main	8198	100-yr DNR	Base-New 7H	10800	370.60	390.73	386.73	0.000201	3.18	10801.29	1904.90	0.15
Main	8198	100-yr DNR	Rev Levee+W/L	10800	370.60	390.73	386.87	0.000245	3.51	9693.96	1669.76	0.17
Main	8632	100-yr DNR	Base-Orig 7H	10800	371.40	390.82	390.85	0.000099	2.31	13605.41	2683.35	0.11
Main	8632	100-yr DNR	Base-New 7H	10800	371.40	390.82	390.85	0.000099	2.31	13605.41	2683.35	0.11
Main	8632	100-yr DNR	Rev Levee+W/L	10800	371.40	390.85	386.57	0.000109	2.42	12262.17	2095.48	0.11
Main	9650	100-yr DNR	Base-Orig 7H	10800	371.10	390.94	391.02	0.00026	3.68	12169.59	2394.28	0.17
Main	9650	100-yr DNR	Base-New 7H	10800	371.10	390.94	391.02	0.00026	3.68	12169.59	2394.28	0.17
Main	9650	100-yr DNR	Rev Levee+W/L	10800	371.10	390.91	387.76	0.000588	5.52	6016.04	1164.87	0.26
Main	10695	100-yr DNR	Base-Orig 7H	10800	370.60	391.19	391.22	0.00014	2.67	16658.05	3338.03	0.13
Main	10695	100-yr DNR	Base-New 7H	10800	370.60	391.19	391.22	0.00014	2.67	16658.05	3338.03	0.13
Main	10695	100-yr DNR	Rev Levee+W/L	10800	370.60	391.52	388.20	0.000353	4.30	8468.41	1744.57	0.20
Main	11195	100-yr DNR	Base-Orig 7H	10800	370.80	391.26	387.45	0.000162	2.82	15121.10	3003.73	0.14
Main	11195	100-yr DNR	Base-New 7H	10800	370.80	391.26	387.45	0.000162	2.82	15121.10	3003.73	0.14
Main	11195	100-yr DNR	Rev Levee+W/L	10800	370.80	391.70	388.47	0.000327	4.10	7585.05	1560.27	0.20
Main	11675	100-yr DNR	Base-Orig 7H	10800	372.60	391.33	387.76	0.000179	3.08	13417.99	2622.30	0.14
Main	11675	100-yr DNR	Base-New 7H	10800	372.60	391.33	387.76	0.000179	3.08	13417.99	2622.30	0.14
Main	11675	100-yr DNR	Rev Levee+W/L	10800	372.60	391.83	385.89	0.000431	4.89	6697.39	1602.83	0.22
Main	12644	100-yr DNR	Base-Orig 7H	10800	373.40	391.52	388.27	0.000235	3.44	14468.59	3313.98	0.17
Main	12644	100-yr DNR	Base-New 7H	10800	373.40	391.52	388.27	0.000235	3.44	14468.59	3313.98	0.17
Main	12644	100-yr DNR	Rev Levee+W/L	10800	373.40	392.25	388.28	0.0005	5.20	6654.70	1424.68	0.24
Main	13576	100-yr DNR	Base-Orig 7H	10800	373.10	391.76	388.64	0.000246	3.57	14011.93	3650.94	0.16
Main	13576	100-yr DNR	Base-New 7H	10800	373.10	391.76	388.64	0.000246	3.57	14011.93	3650.94	0.16
Main	13576	100-yr DNR	Rev Levee+W/L	10800	373.10	392.77	386.50	0.000382	4.65	8132.20	2130.71	0.21
Main	14286	100-yr DNR	Base-Orig 7H	10800	373.50	391.90	389.07	0.000271	3.67	14044.46	3793.29	0.18

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Main	14286	100-yr DNR	Base-New 7H	10800	373.50	391.90	389.07	391.97	0.000271	3.67	14044.46	3793.29	0.18
Main	14286	100-yr DNR	Rev Levee+W/L	10800	373.50	393.01	389.55	393.17	0.000398	4.69	8448.60	2003.97	0.22
Main	15430	100-yr DNR	Base-Orig 7H	10800	374.50	392.17	388.74	392.21	0.00017	2.95	17156.04	4359.92	0.14
Main	15430	100-yr DNR	Base-New 7H	10800	374.50	392.17	388.74	392.21	0.00017	2.95	17156.04	4359.92	0.14
Main	15430	100-yr DNR	Rev Levee+W/L	10800	374.50	393.42	386.77	393.49	0.000199	3.39	10044.85	1974.32	0.16
Main	16643	100-yr DNR	Base-Orig 7H	10800	373.90	392.47	389.39	392.57	0.000329	3.95	10040.71	2147.21	0.19
Main	16643	100-yr DNR	Base-New 7H	10800	373.90	392.47	389.39	392.57	0.000329	3.95	10040.71	2147.21	0.19
Main	16643	100-yr DNR	Rev Levee+W/L	10800	373.90	393.75	386.95	393.85	0.000288	3.93	9128.01	1857.14	0.18
Main	17568	100-yr DNR	Base-Orig 7H	10800	374.00	392.79	389.73	392.86	0.000291	3.70	13284.64	2953.63	0.18
Main	17568	100-yr DNR	Base-New 7H	10800	374.00	392.79	389.73	392.86	0.000291	3.70	13284.64	2953.63	0.18
Main	17568	100-yr DNR	Rev Levee+W/L	10800	374.00	394.01	389.73	394.05	0.00015	2.82	16901.63	2960.48	0.13
Main	18359	100-yr DNR	Base-Orig 7H	10800	375.70	393.00		393.06	0.000219	3.32	14560.67	3289.30	0.16
Main	18359	100-yr DNR	Base-New 7H	10800	375.70	393.00		393.06	0.000219	3.32	14560.67	3289.30	0.16
Main	18359	100-yr DNR	Rev Levee+W/L	10800	375.70	394.12		394.16	0.000124	2.63	18353.28	3517.22	0.12
Main	19210	100-yr DNR	Base-New 7H	10700	374.40	393.23	387.04	393.37	0.00037	4.39	9656.07	2511.00	0.21
Main	19210	100-yr DNR	Rev Levee+W/L	10700	374.40	394.25	387.04	394.32	0.0002	3.38	13107.76	2511.00	0.15
Main	19339	100-yr DNR	Base-Orig 7H	10700	374.30	393.24		393.33	0.000257	3.72	12943.95	2695.76	0.17
Main	19364			Mult Open									
Main	19389	100-yr DNR	Base-Orig 7H	10700	374.30	393.28	386.62	393.37	0.000252	3.69	13041.05	2697.09	0.17
Main	19428	100-yr DNR	Base-New 7H	10700	374.40	393.32	387.04	393.45	0.000363	4.36	9820.14	2511.00	0.20
Main	19428	100-yr DNR	Rev Levee+W/L	10700	374.40	394.30	387.04	394.38	0.000199	3.38	13186.44	2511.00	0.15
Main	20608	100-yr DNR	Base-Orig 7H	10700	373.40	393.57		393.70	0.000408	4.53	10122.19	2371.89	0.21
Main	20608	100-yr DNR	Base-New 7H	10700	373.40	393.71		393.84	0.000375	4.38	10474.07	2374.09	0.21
Main	20608	100-yr DNR	Rev Levee+W/L	10700	373.40	394.52		394.60	0.000246	3.68	12393.80	2384.72	0.17
Main	21182	100-yr DNR	Base-Orig 7H	10700	373.50	393.80		393.91	0.000296	4.01	10274.72	2360.35	0.18
Main	21182	100-yr DNR	Base-New 7H	10700	373.50	393.93		394.03	0.000276	3.89	10579.54	2362.28	0.18
Main	21182	100-yr DNR	Rev Levee+W/L	10700	373.50	394.66		394.73	0.000188	3.31	12310.41	2373.21	0.15
Main	22202	100-yr DNR	Base-Orig 7H	10700	374.80	394.10		394.21	0.000301	3.88	10196.92	2294.04	0.19
Main	22202	100-yr DNR	Base-New 7H	10700	374.80	394.21		394.31	0.000283	3.79	10446.65	2295.55	0.18
Main	22202	100-yr DNR	Rev Levee+W/L	10700	374.80	394.86		394.93	0.000203	3.31	11925.65	2304.49	0.16

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Main	23189	100-yr DNR	Base-Orig 7H	10700	374.40	394.43	394.65	0.000636	5.22	8301.29	2081.47	0.27
Main	23189	100-yr DNR	Base-New 7H	10700	374.40	394.52	394.73	0.000603	5.11	8488.45	2082.09	0.26
Main	23189	100-yr DNR	Rev Levee+WL	10700	374.40	395.08	395.22	0.00044	4.50	9644.89	2085.97	0.22
Main	24227	100-yr DNR	Base-Orig 7H	10700	375.30	395.02	395.14	0.000357	4.17	10419.40	2210.89	0.20
Main	24227	100-yr DNR	Base-New 7H	10700	375.30	395.08	395.20	0.000346	4.11	10556.44	2213.04	0.20
Main	24227	100-yr DNR	Rev Levee+WL	10700	375.30	395.49	395.59	0.00028	3.78	11475.01	2227.43	0.18
Main	25345	100-yr DNR	Base-Orig 7H	10700	375.10	395.37	388.05	0.000632	5.92	5975.06	2822.38	0.27
Main	25345	100-yr DNR	Base-New 7H	10700	375.10	395.42	395.78	0.000618	5.87	6046.08	2827.50	0.27
Main	25345	100-yr DNR	Rev Levee+WL	10700	375.10	395.77	396.08	0.00053	5.52	6535.98	2862.80	0.25
Main	26300	100-yr DNR	Base-Orig 7H	10700	376.40	395.82	389.09	0.001394	8.51	2278.08	1997.75	0.40
Main	26300	100-yr DNR	Base-New 7H	10700	376.40	395.85	396.86	0.001378	8.47	2296.21	1998.06	0.40
Main	26300	100-yr DNR	Rev Levee+WL	10700	376.40	396.11	397.05	0.001266	8.22	2427.13	2000.04	0.38
Main	26532	100-yr DNR	Base-Orig 7H	10700	374.20	396.83	386.98	0.000503	5.47	4291.89	1838.20	0.24
Main	26532	100-yr DNR	Base-New 7H	10700	374.2	396.85	397.23	0.000499	5.45	4310.56	1839.34	0.24
Main	26532	100-yr DNR	Rev Levee+WL	10700	374.2	397.03	397.39	0.000473	5.34	4449.49	1847.79	0.24
Main	26635			Mult Open								
Main	26710	100-yr DNR	Base-Orig 7H	10700	374.2	397.07	386.98	0.000467	5.32	4479.54	1849.6	0.23
Main	26710	100-yr DNR	Base-New 7H	10700	374.2	397.09	397.45	0.000464	5.31	4497.28	1850.68	0.23
Main	26710	100-yr DNR	Rev Levee+WL	10700	374.2	397.26	397.6	0.000441	5.21	4629.99	1858.65	0.23
Main	27225	100-yr DNR	Base-Orig 7H	10700	376.7	397.42	389.09	0.000412	4.98	6643.37	2238.04	0.22
Main	27225	100-yr DNR	Base-New 7H	10700	376.7	397.44	397.68	0.000409	4.96	6666.62	2238.21	0.22
Main	27225	100-yr DNR	Rev Levee+WL	10700	376.7	397.59	397.82	0.000386	4.85	6840.45	2239.52	0.21
Main	28211	100-yr DNR	Base-Orig 7H	10700	376.8	397.79	397.81	0.000063	1.98	19083.15	3511.53	0.09
Main	28211	100-yr DNR	Base-New 7H	10700	376.8	397.81	397.83	0.000062	1.97	19144.88	3511.65	0.08
Main	28211	100-yr DNR	Rev Levee+WL	10700	376.8	397.94	397.96	0.000058	1.92	19609.41	3512.6	0.08
Main	29140	100-yr DNR	Base-Orig 7H	10700	377.9	397.82	389.55	0.000291	4.12	10286.63	2970.04	0.19
Main	29140	100-yr DNR	Base-New 7H	10700	377.9	397.84	389.55	0.000289	4.11	10321.6	2970.2	0.19
Main	29140	100-yr DNR	Rev Levee+WL	10700	377.9	397.97	389.55	0.000272	4.01	10584.71	2971.36	0.18
Main	30300	100-yr DNR	Base-Orig 7H	10700	378.2	398.15	389.87	0.00037	4.69	7114.98	3829.42	0.21
Main	30300	100-yr DNR	Base-New 7H	10700	378.2	398.17	389.87	0.000367	4.68	7141.16	3830.19	0.21
Main	30300	100-yr DNR	Rev Levee+WL	10700	378.2	398.28	389.87	0.000344	4.55	7339.62	3836.04	0.2
Main	31245	100-yr DNR	Base-Orig 7H	10700	377.1	398.4	399.15	0.000986	7.37	2473.37	3771.06	0.34

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Main	31245	100-yr DNR	Base-New 7H	10700	377.1	398.41	390.13	399.16	0.000983	7.36	2477.91	3771.52	0.34
Main	31245	100-yr DNR	Rev Levee+WL	10700	377.1	398.5	390.13	399.24	0.000957	7.29	2512.73	3775.04	0.34
Main	31320			Bridge									
Main	31405	100-yr DNR	Base-Orig 7H	10700	377.3	398.77	391.78	399.56	0.001022	7.6	2535.49	3863.16	0.35
Main	31405	100-yr DNR	Base-New 7H	10700	377.3	398.78	391.78	399.57	0.001019	7.59	2539.65	3863.47	0.35
Main	31405	100-yr DNR	Rev Levee+WL	10700	377.3	398.87	391.78	399.63	0.000995	7.53	2571.69	3865.86	0.35
Main	31648	100-yr DNR	Base-Orig 7H	10700	377.5	399.12	391.53	399.82	0.000978	7.2	2624.53	3938.01	0.34
Main	31648	100-yr DNR	Base-New 7H	10700	377.5	399.13	391.53	399.83	0.000975	7.19	2628.33	3938.32	0.34
Main	31648	100-yr DNR	Rev Levee+WL	10700	377.5	399.2	391.53	399.89	0.000954	7.14	2657.7	3940.72	0.34
Main	31735			Bridge									
Main	31803	100-yr DNR	Base-Orig 7H	10700	377.6	399.6	391.28	400.17	0.000813	6.49	2776.4	3894.4	0.31
Main	31803	100-yr DNR	Base-New 7H	10700	377.6	399.61	391.28	400.18	0.000811	6.49	2779.34	3894.77	0.31
Main	31803	100-yr DNR	Rev Levee+WL	10700	377.6	399.67	391.28	400.23	0.000796	6.45	2802.21	3897.66	0.31
Main	32148	100-yr DNR	Base-Orig 7H	10700	377.7	400.18	391.4	400.46	0.000416	5	5679.65	4023.29	0.23
Main	32148	100-yr DNR	Base-New 7H	10700	377.7	400.18	391.4	400.46	0.000415	5	5686.03	4023.41	0.23
Main	32148	100-yr DNR	Rev Levee+WL	10700	377.7	400.24	391.4	400.51	0.000407	4.96	5735.82	4024.41	0.23

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TABLE 2 - HEC-RAS River: Pigeon Creek Reach: Main Profile: 10-yr DNR (Permit S-357, Attachment VI.B.2.e. - Item D)													
Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Main	0	10-yr DNR	BaseNew7H10y	6250	369.38	387.16	378.88	387.20	0.000127	2.52	10865.25	2498.43	0.12
Main	0	10-yr DNR	MineLevee10y	6250	369.38	387.16	378.88	387.20	0.000127	2.52	10865.25	2498.43	0.12
Main	695	10-yr DNR	BaseNew7H10y	6250	369.48	387.25	379.58	387.30	0.000162	2.83	7244.68	2360.32	0.14
Main	695	10-yr DNR	MineLevee10y	6250	369.48	387.25	379.58	387.30	0.000162	2.83	7244.68	2360.32	0.14
Main	1175	10-yr DNR	BaseNew7H10y	6250	369.54	387.33	379.99	387.41	0.000226	3.21	5828.10	2370.51	0.16
Main	1175	10-yr DNR	MineLevee10y	6250	369.54	387.33	379.99	387.41	0.000226	3.21	5828.10	2370.51	0.16
Main	1628	10-yr DNR	BaseNew7H10y	6250	369.60	387.38	379.26	387.53	0.000266	3.70	3111.45	2411.69	0.18
Main	1628	10-yr DNR	MineLevee10y	6250	369.60	387.38	379.26	387.53	0.000266	3.70	3111.45	2411.69	0.18
Main	1682			Mult Open									
Main	1735	10-yr DNR	BaseNew7H10y	6250	369.60	387.44	379.26	387.59	0.00026	3.67	3146.34	2414.13	0.18
Main	1735	10-yr DNR	MineLevee10y	6250	369.60	387.44	379.26	387.59	0.00026	3.67	3146.34	2414.13	0.18
Main	2155	10-yr DNR	BaseNew7H10y	6250	369.80	387.62	380.81	387.72	0.000264	3.53	6907.63	2569.68	0.17
Main	2155	10-yr DNR	MineLevee10y	6250	369.80	387.62	380.81	387.72	0.000264	3.53	6907.63	2569.68	0.17
Main	2623	10-yr DNR	BaseNew7H10y	6100	369.80	387.77	379.46	387.82	0.000149	2.73	9564.17	2668.23	0.13
Main	2623	10-yr DNR	MineLevee10y	6100	369.80	387.77	379.46	387.82	0.000149	2.73	9564.17	2668.23	0.13
Main	3142	10-yr DNR	BaseNew7H10y	6100	368.10	387.86	380.07	387.89	0.0001	2.15	12636.70	2979.76	0.11
Main	3142	10-yr DNR	MineLevee10y	6100	368.10	387.86	380.07	387.89	0.0001	2.15	12636.70	2979.76	0.11
Main	4061	10-yr DNR	BaseNew7H10y	6100	368.90	387.96		387.97	0.000084	1.94	14072.33	3092.72	0.09
Main	4061	10-yr DNR	MineLevee10y	6100	368.90	387.96		387.97	0.000084	1.94	14072.33	3092.72	0.09
Main	5153	10-yr DNR	BaseNew7H10y	6100	370.00	388.06		388.08	0.000109	2.11	11028.51	2561.93	0.11
Main	5153	10-yr DNR	MineLevee10y	6100	370.00	388.06		388.08	0.000109	2.11	11028.51	2561.93	0.11
Main	6203	10-yr DNR	BaseNew7H10y	6100	370.20	388.18		388.23	0.000171	2.78	8288.07	1866.97	0.14
Main	6203	10-yr DNR	MineLevee10y	6100	370.20	388.18		388.23	0.000171	2.78	8288.07	1866.97	0.14
Main	7162	10-yr DNR	BaseNew7H10y	6100	371.20	388.33		388.37	0.000115	2.44	8504.52	2216.47	0.11
Main	7162	10-yr DNR	MineLevee10y	6100	371.20	388.33		388.37	0.000115	2.44	8504.52	2216.47	0.11
Main	8198	10-yr DNR	BaseNew7H10y	6100	370.60	388.48	381.49	388.55	0.000242	3.08	6564.24	1858.19	0.16
Main	8198	10-yr DNR	MineLevee10y	6100	370.60	388.48	381.50	388.57	0.000283	3.34	5945.03	1661.31	0.18

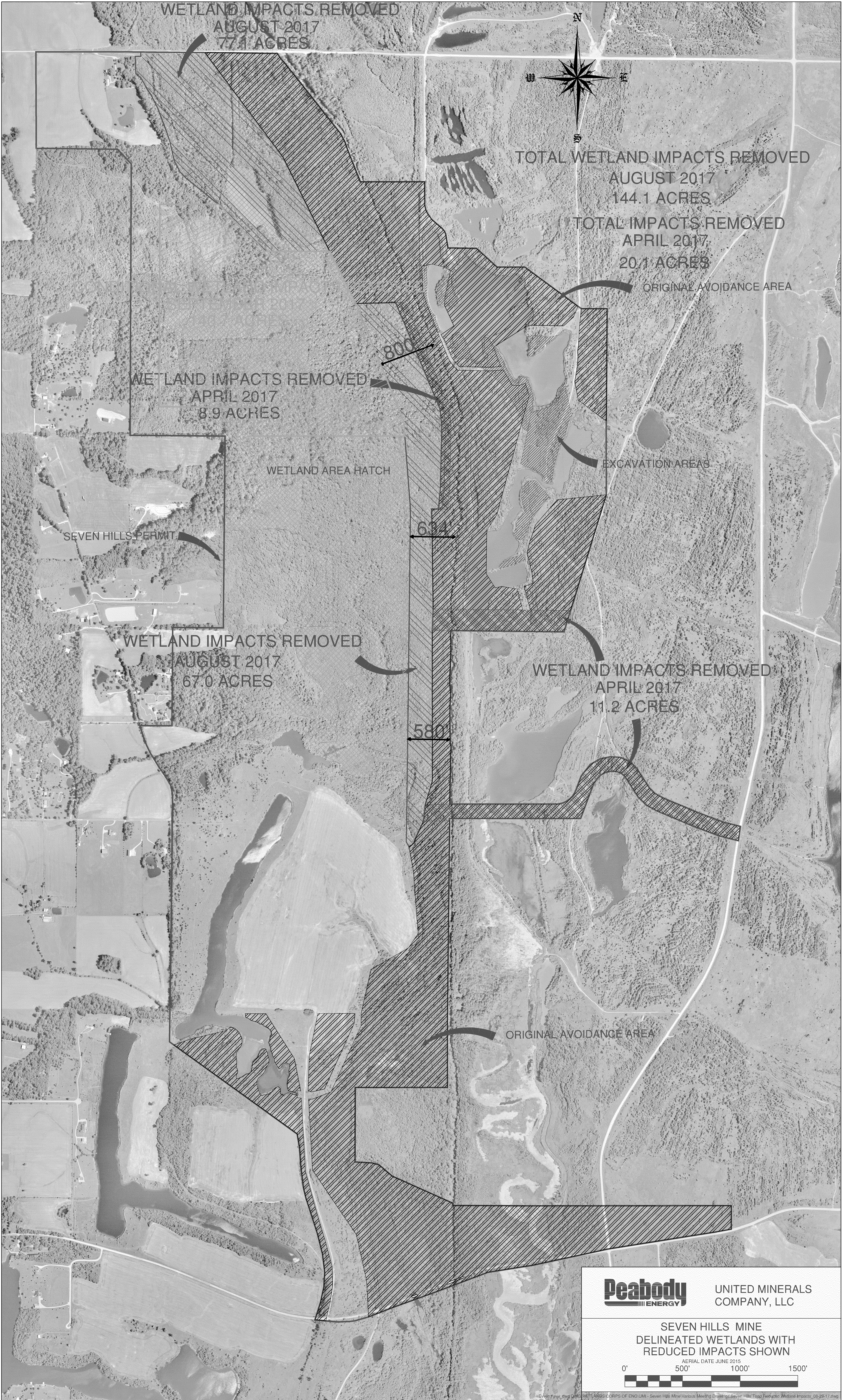
Table 2 - Page 1

Main	19428	10-yr DNR	MineLevee10y	6000	374.40	392.34	383.52	392.41	0.000186	2.98	8251.80	2511.00	0.14
Main	20608	10-yr DNR	BaseNew7H10y	6000	373.40	392.01		392.14	0.000339	3.82	6445.19	2348.78	0.19
Main	20608	10-yr DNR	MineLevee10y	6000	373.40	392.55		392.63	0.000237	3.28	7712.12	2356.77	0.16
Main	21182	10-yr DNR	BaseNew7H10y	6000	373.50	392.21		392.31	0.000255	3.44	6523.98	2336.48	0.17
Main	21182	10-yr DNR	MineLevee10y	6000	373.50	392.68		392.75	0.000184	3.00	7641.15	2343.62	0.14
Main	22202	10-yr DNR	BaseNew7H10y	6000	374.80	392.47		392.57	0.000259	3.30	6467.50	2271.33	0.17
Main	22202	10-yr DNR	MineLevee10y	6000	374.80	392.87		392.95	0.000198	2.95	7387.14	2276.95	0.15
Main	23189	10-yr DNR	BaseNew7H10y	6000	374.40	392.75		392.98	0.000626	4.67	4804.26	2069.69	0.26
Main	23189	10-yr DNR	MineLevee10y	6000	374.40	393.09		393.26	0.000487	4.21	5505.76	2072.06	0.23
Main	24227	10-yr DNR	BaseNew7H10y	6000	375.30	393.32		393.43	0.000305	3.51	6712.31	2156.59	0.18
Main	24227	10-yr DNR	MineLevee10y	6000	375.30	393.54		393.64	0.000265	3.31	7186.78	2162.69	0.17
Main	25345	10-yr DNR	BaseNew7H10y	6000	375.10	393.62	384.54	393.90	0.00046	4.64	3521.87	2617.18	0.22
Main	25345	10-yr DNR	MineLevee10y	6000	375.10	393.80	384.54	394.05	0.000421	4.48	3768.09	2648.19	0.22
Main	26300	10-yr DNR	BaseNew7H10y	6000	376.40	394.03	385.63	394.56	0.000808	5.91	1375.19	1982.22	0.30
Main	26300	10-yr DNR	MineLevee10y	6000	376.40	394.16	385.63	394.67	0.000771	5.82	1443.70	1983.40	0.29
Main	26532	10-yr DNR	BaseNew7H10y	6000	374.20	394.53	383.71	394.76	0.000337	4.03	2591.63	1746.74	0.19
Main	26532	10-yr DNR	MineLevee10y	6000	374.20	394.64	383.71	394.87	0.000323	3.97	2675.06	1750.89	0.19
Main	26635		Mult Open										
Main	26710	10-yr DNR	BaseNew7H10y	6000	374.20	394.64	383.71	394.87	0.000324	3.97	2670.50	1750.66	0.19
Main	26710	10-yr DNR	MineLevee10y	6000	374.20	394.75	383.71	394.98	0.000312	3.92	2752.20	1754.72	0.19
Main	27225	10-yr DNR	BaseNew7H10y	6000	376.70	394.82	386.01	395.05	0.000384	4.26	3707.74	2215.96	0.21
Main	27225	10-yr DNR	MineLevee10y	6000	376.70	394.93	386.01	395.15	0.000366	4.18	3831.37	2216.90	0.20
Main	28211	10-yr DNR	BaseNew7H10y	6000	376.80	395.20		395.24	0.000101	2.25	10014.59	3492.97	0.11
Main	28211	10-yr DNR	MineLevee10y	6000	376.80	395.30		395.33	0.000095	2.18	10329.62	3493.62	0.10
Main	29140	10-yr DNR	BaseNew7H10y	6000	377.90	395.26	386.23	395.45	0.00036	4.05	5132.93	2947.21	0.20
Main	29140	10-yr DNR	MineLevee10y	6000	377.90	395.34	386.23	395.52	0.000342	3.97	5304.71	2947.97	0.20
Main	30300	10-yr DNR	BaseNew7H10y	6000	378.20	395.64	386.73	395.98	0.00051	4.90	2691.16	3501.35	0.24
Main	30300	10-yr DNR	MineLevee10y	6000	378.20	395.71	386.73	396.03	0.000494	4.85	2800.87	3540.99	0.24

Table 2 - Page 3

Main	31245	10-yr DNR	BaseNew7H10y	6000	377.10	396.13	386.65	396.54	0.000637	5.28	1573.53	3284.87	0.27
Main	31245	10-yr DNR	MineLevee10y	6000	377.10	396.18	386.65	396.59	0.000626	5.25	1593.46	3338.19	0.27
Main	31320			Bridge									
Main	31405	10-yr DNR	BaseNew7H10y	6000	377.30	396.29	388.29	396.76	0.000721	5.63	1541.10	3774.96	0.29
Main	31405	10-yr DNR	MineLevee10y	6000	377.30	396.34	388.29	396.80	0.000709	5.59	1560.44	3776.80	0.28
Main	31648	10-yr DNR	BaseNew7H10y	6000	377.50	396.50	388.03	396.94	0.000752	5.48	1541.37	3792.59	0.29
Main	31648	10-yr DNR	MineLevee10y	6000	377.50	396.54	388.03	396.98	0.00074	5.45	1559.89	3795.80	0.29
Main	31735			Bridge									
Main	31803	10-yr DNR	BaseNew7H10y	6000	377.60	396.77	387.84	397.14	0.000667	5.02	1723.64	3652.92	0.27
Main	31803	10-yr DNR	MineLevee10y	6000	377.60	396.82	387.84	397.18	0.000657	4.99	1739.00	3658.51	0.27
Main	32148	10-yr DNR	BaseNew7H10y	6000	377.70	397.09	388.21	397.36	0.000441	4.41	2828.30	3699.63	0.23
Main	32148	10-yr DNR	MineLevee10y	6000	377.70	397.13	388.21	397.39	0.000433	4.38	2863.89	3706.34	0.22

Table 2 - Page 4





United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

RE: Modification to Pending Permit Application No. LRL-2013-635-gjd

Dear Colonel Gant:

Previously, we proposed a revised mine plan which significantly reduces wetland impacts at the proposed Seven Hills mine site. This plan includes removing 162 acres of wetlands and 9,445 linear feet from the planned impact area and only requesting "Conditional" approval for future impacts to 140 acres of wetlands and 10,617 linear feet of ephemeral and intermittent streams. Our proposal is for approval to conduct mining operations in the initial area. This will allow Peabody, the Corps and the Indiana Department of Natural Resources (INDNR) to monitor the on-site and off-site mitigation efforts and whether or not significant secondary impacts to the adjacent wetlands are occurring. As you are aware, Peabody has provided engineering and environmental analysis and numerous past mining examples that indicate adjacent negative impacts are not expected; however, if the indirect impacts are significant and/or the mitigation is not being completed as the permit requires the permit "Condition" is not met. As a result, Peabody would not be allowed to continue mining into the 140 acres of wetlands depicted on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and mining is allowed to continue through the "Conditional" 140 acre wetland area. Peabody will also work with the Corps to develop an effective Adaptive Management Plan (AMP) to outline monitoring and any needed corrective actions.

This modification directly responds to concerns raised by the Corps, USEPA and the U.S. Fish and Wildlife Service including:

- Increasing the undisturbed buffer along the west side of Pigeon Creek. The original plan included a minimum buffer width of approximately 110 feet, which is a typical setback distance from a perennial stream. The minimum buffer width will now be 580 feet. While Pigeon Creek is a straightened, dredged and actively eroding channel, the nearly fivefold increase in buffer width will provide additional protection between the mining area and stream and significant travel and habitat areas for potential wildlife and aquatic species including the Indiana Bat and Copperbelly Water snake. Along with the approved Protection and Enhancement Plans (PEPs) included in the approved Surface Mining

Control and Reclamation Act (SMCRA) permit, this plan modification will provide even greater protections to any species of concern.

- The overall footprint of the mining operation has been decreased. It was mentioned in a meeting with the Louisville District that the project needed to be reduced to a “couple hundred acres” of wetland impacts. It is unclear what this direction is based upon, but it does make the initial wetland impact acreage similar to wetland impacts approved through Environmental Assessments and mitigated FONSI at Bear Run (235 acres of wetland impacts) and Wild Boar (145 acres of wetland impacts). This modification achieves the balance of minimizing the impact while allowing production of an important and valuable energy resource. Unfortunately, the reduced impact area results in an additional 3 million tons of high quality coal remaining in the ground. Nevertheless, a safe and efficient mine can still occur, albeit at a reduced annual production rate.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Wetland Quality

Given you only recently assumed command over the Louisville District, the following summary of the wetland characteristics of the planned impact site are provided to refute incorrect claims of the wetlands being special and unique.

- There are no special or unique trees. In fact, the tree species are typical of southwestern Indiana forested wetlands, according to a review by a professional forester. Logging has occurred on multiple occasions. Please note many of the tree species present on the site are not allowed to be planted for mitigation purposes in the Louisville District, due to the less desirable non-hardwood species.
- Nearly 80% of the wetlands planned for impacts were previously farmed with conventional agricultural methods. The wetlands developed by simply ceasing to farm over time, likely due to increasing beaver activity.

- There is infrequent overbank flooding (3 -7 days per year on average) into the wetlands from Pigeon Creek. In addition, the channel connections from the wetlands into Pigeon Creek are actively eroding and head cutting further into the wetlands.
- The modified plan results in impacts to only 2.1% of the wetlands in the Highland – Pigeon Watershed. The Seven Hills wetlands are not a significant portion of the wetlands in the watershed and the wetland acreages will increase with the additional mitigation proposed in this plan.
- Pigeon Creek is a straightened, eroding, low quality stream. Aquatic life sampling indicates values are rated “fair”. This is similar to what is found in agricultural areas in southern Indiana
- The Hydrogeomorphic (HGM) analysis shows the wetlands can be fully mitigated with an approximate 2:1 mitigation ratio. HGM does not indicate the Seven Hills wetlands are special or unique, it is only a relative measure compared to wetlands in western Kentucky that were used as a reference. Again, these wetlands mostly developed by ceasing farming activities. If a special and unique wetland is present in the area, the Patoka River wetlands located approximately 15 miles north of Seven Hills may be an example. This multi-thousand acre wetland complex is diverse and much more valuable than the Seven Hills wetlands.

Mitigation

Peabody is proposing on-site mitigation/minimization at a ratio of 1:1, off-site mitigation at a ratio of 1.5:1 and many additional enhancements which are quantified in the table below. The Greathouse Island property located adjacent to the Wabash River was previously proposed for mitigation; however, the surprisingly low credit values the Corps was willing to grant for this property caused Peabody to drop the option it had to purchase this property. The option was held for 5 years and nearly \$400,000 was invested on what was and is still believed to be a very high potential mitigation property. We have recently requested guidance on mitigation credits for properties within the Highland -Pigeon watershed and in adjacent watersheds, yet the Louisville District has not provided any clear guidance on the potential mitigation value for these properties. The acquisition of such properties is time consuming and there are other entities competing to acquire these properties. The inability to gain a clear understanding of the mitigation value that the Corps will grant puts Peabody in a competitive disadvantage and leads to missed opportunities and wasted time and resources. This is especially frustrating and confusing, when the Louisville District suggested earlier this year, that we contact the Patoka National Wildlife Refuge manager about potential mitigation properties in the Refuge target area that would be desirable mitigation properties for Seven Hills. Further, site visits were made with Louisville District personnel and favorable verbal opinions were given on the value of one property that Peabody has the potential to

acquire. Peabody renews its request to obtain clear guidance on potential mitigation values of properties that it brings forward, so it has a fair opportunity to obtain these properties and not waste valuable time and resources similar to the Greathouse Island example.

Considering the reluctance to engage on specific mitigation, Peabody is proposing the following conceptual mitigation plan. This plan can be finalized with site specific data following agreement on the requirement and appropriate feedback on mitigation values of proposed properties.

- Peabody will provide a 2.5:1 wetland mitigation ratio consisting of 1:1 acres on-site and 1.5:1 acres off-site. The HGM process which the Corps and EPA requested Peabody to use in the spring of this year, indicates an approximate 2:1 mitigation ratio fully mitigates the planned site impacts. This is consistent with the HGM assessment completed at this site initially in 2007. The HGM process has not been utilized previously for other Peabody permits in the Louisville District and it appears to provide a much better and transparent method of calculating wetland mitigation needs than the ambiguous methods employed in the past.
 - Regarding the off-site mitigation, Peabody commits to providing 1:1 acreage in the Highland – Pigeon watershed. At a minimum, this will fully mitigate the site impacts in the same watershed. When other mitigation enhancements are considered as described below, the actual mitigation ratio is increased further. It is important to note the off-site mitigation will not only create additional wetlands, but it will also reduce conventional agriculture activities as this acreage will consist of converting current croplands to wetlands.
 - Peabody will provide approximately 0.5:1 mitigation in the Highland – Pigeon or adjacent watersheds. Please note the adjacent watersheds in southwest Indiana are very similar in watershed impacts and needed improvements as there is a prevalence of conventional agricultural activities occurring in the region.
 - Peabody will complete the mitigation as a mix of forested, scrub/shrub and emergent wetlands in a manner representative of the impact site or complete all of the mitigation as a forested wetland. Forested wetlands have been considered to be of higher value by the Louisville District to date.
 - Peabody will utilize high value hardwood tree species on both the on-site and off-site mitigation areas. Please note the Louisville District has not allowed Peabody to plant many of the existing tree species currently present at the site.
 - Peabody will add intentional diversity (pools, roughness, etc.) into the topography to enhance the site.

- Peabody will lower elevations of previously reclaimed areas on the east side of Pigeon Creek to create additional wetlands that will receive more overbank flow from Pigeon Creek and provide additional flood storage and flood water treatment. This issue was deemed very important to the US Fish and Wildlife Service and also serves to create additional habitat for many local species. Please note this work will be completed in advance of mining operations as part of the work is also needed for the flood control purposes during mining. This area will remain in its current state and the floodplain will not be expanded if the mining project is not allowed.
- Peabody will repair existing drainages and install appropriate stabilizing and habitat enhancing structures in the avoidance areas between the mining area and Pigeon Creek. These drainages are currently actively eroding and head cutting through the wetlands. If this project does not move forward, these drainages will continue eroding and will degrade the wetlands over time. Peabody will also restore impacted intermittent drainages at a 1:1 mitigation ratio with appropriate natural stream construction enhancements.
- At the completion of mining, Peabody will remove the “levee” along the west side of Pigeon Creek in strategic locations to improve the connectivity and over bank flooding of the creek into the wetlands. If the mining project does not occur, this improvement will not occur.
- Peabody will incorporate Copperbelly watersnake (CWS) habitat into its mitigation plan along Pigeon Creek to address U.S. Fish and Wildlife Service concerns. These efforts have proven to be successful at previous mining locations, including the Columbia Mine which has been added to the Patoka National Wildlife Refuge. Also, please note one of the recent potential mitigation properties submitted to the Corps for a mitigation value determination is in the Patoka River watershed and within the Refuge target acquisition area and is considered Core Habitat for the CWS. The Refuge has been unable to acquire this property; however, the property could be acquired and used as mitigation for this property, if the mitigation values were known and valued correctly.
- Peabody will conduct upstream and downstream sampling for Nutrients before, during and after mining. No impacts are expected regarding Nutrients; however, the sampling can confirm this and will address a concern from U.S. EPA.
- Peabody will place a Conservation Easement on a 20 acre forested wetland in the Pigeon Creek watershed, located approximately 3 miles south of the mining area. An Indiana Bat roost tree was identified on this tract in a 2008 Indiana Bat survey and the tract contains numerous trees with sloughing bark which is ideal roost tree habitat. This tract is currently not included in a permit and not subject to the Protection and Enhancement Plans (PEPs); therefore, timber cutting could occur at any time. Peabody intentionally acquired this

property for this purpose and will likely sell it, if appropriate credit is not given. This area will be protected in perpetuity if the mining project occurs.

- As mentioned previously, a minimum buffer width of 580 feet will be in place between the mining area and Pigeon Creek. The buffer is up to 800 feet wide in some stretches. This area will be protected with a conservation easement that will prevent future timber cutting. This protection will not be in place if the mining project is not approved.
- Peabody owns additional properties in the Pigeon Creek corridor which it is willing to consider site protection instruments on if appropriate mitigation credit is provided.

Given the direct mitigation acreage and enhancements listed above, Peabody believes the wetland mitigation value for the initial 207 acres of wetland impacts is outlined in the table below.

Mitigation Activity	Acreage	Mitigation Credit Factor	Total Credit
On-site mitigation	207	1	207
On-site Protection	207	0.2	41
Off-site mitigation	311	1	311
Off-site Protection	311	0.15	47
Removal of active cropland by conversion to wetlands	311	0.1	31
Preferred hardwood tree species	518	0.05	26
Stabilize and repair drainages, remove levee and add CWS habitat in avoidance/buffer area	219	0.1	22
Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

This project is very important to Peabody's Midwest operations and workforce and we are hopeful that any remaining issues can be resolved promptly. Upon agreement of the plan modification, Peabody will move forward to revise all applicable parts of the application. If you have any questions or comments, I can be reached by email at Bwest@peabodyenergy.com or at 812-455-278.

Sincerely,

Bryce West
Vice President Environmental Services

Enclosures



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGIONAL ADMINISTRATOR
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAR 05 2018

Colonel Antoinette R. Gant
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

SUBJECT: Modification to Pending Permit Application No. LRL-2013-635-gjd — Seven Hills Mine

Dear Colonel Gant:

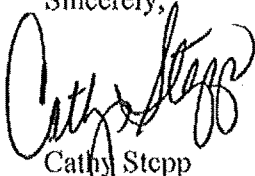
As the newly appointed Regional Administrator for Region 5 of the U.S. Environmental Protection Agency (EPA or Agency), I am writing to you regarding the proposed Seven Hills surface coal mine. A subsidiary of Peabody Energy had previously applied for a Clean Water Act section 404 permit from the U.S. Army Corps of Engineers for the proposed mine to be located in Warrick County, Indiana. I understand the site is already approved under the Surface Mining Control and Reclamation Act. During the last several years, EPA Region 5 has appreciated the opportunity to work with the Louisville District, along with the U.S. Fish and Wildlife Service, to evaluate the potential environmental impacts of this proposed project. In 2016, EPA Region 5 advised the Louisville District about potential impacts to aquatic resources posed by the project as then planned, especially to aquatic resources, and that further coordination between EPA Headquarters and the Department of the Army was warranted.

It is my understanding that over the past year the project sponsor has met with EPA, the Army Corps, and the Fish and Wildlife Service on numerous occasions to discuss the project and late last year submitted a revised project plan to the Army Corps. Based on a preliminary review by EPA staff, it appears the revised plan incorporates a number of changes to reduce the direct impacts on wetlands that were previously discussed.

I appreciate the roles our respective agencies play in ensuring that environmental impacts from projects such as this are properly evaluated consistent with our authorities under the Clean Water Act, and I look forward to continuing our work together in the future. At this time, I do not plan to seek further EPA Headquarters and Department of the Army coordination on the proposed project. As the Army Corps continues its review of the potential environmental impacts of the revised project plan, EPA Region 5 would happy to provide any assistance that the Army Corps may request as it makes any necessary determinations

under Clean Water Act section 404 or the National Environmental Policy Act. Please feel free to contact me with any questions you may have regarding this permit.

Sincerely,

A handwritten signature in black ink, appearing to read "Cathy Stepp". The signature is fluid and cursive, with the first name "Cathy" and last name "Stepp" clearly distinguishable.

Cathy Stepp
Regional Administrator



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGIONAL ADMINISTRATOR
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAR 05 2018

Colonel Antoinette R. Gant
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

SUBJECT: Modification to Pending Permit Application No. LRL-2013-635-gjd — Seven Hills Mine

Dear Colonel Gant:

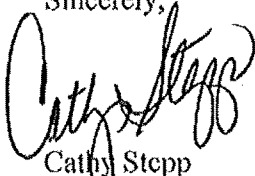
As the newly appointed Regional Administrator for Region 5 of the U.S. Environmental Protection Agency (EPA or Agency), I am writing to you regarding the proposed Seven Hills surface coal mine. A subsidiary of Peabody Energy had previously applied for a Clean Water Act section 404 permit from the U.S. Army Corps of Engineers for the proposed mine to be located in Warrick County, Indiana. I understand the site is already approved under the Surface Mining Control and Reclamation Act. During the last several years, EPA Region 5 has appreciated the opportunity to work with the Louisville District, along with the U.S. Fish and Wildlife Service, to evaluate the potential environmental impacts of this proposed project. In 2016, EPA Region 5 advised the Louisville District about potential impacts to aquatic resources posed by the project as then planned, especially to aquatic resources, and that further coordination between EPA Headquarters and the Department of the Army was warranted.

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I appreciate the roles our respective agencies play in ensuring that environmental impacts from projects such as this are properly evaluated consistent with our authorities under the Clean Water Act, and I look forward to continuing our work together in the future. At this time, I do not plan to seek further EPA Headquarters and Department of the Army coordination on the proposed project. As the Army Corps continues its review of the potential environmental impacts of the revised project plan, EPA Region 5 would happy to provide any assistance that the Army Corps may request as it makes any necessary determinations

under Clean Water Act section 404 or the National Environmental Policy Act. Please feel free to contact me with any questions you may have regarding this permit.

Sincerely,

A handwritten signature in black ink, appearing to read "Cathy Stepp". The signature is fluid and cursive, with the first name "Cathy" being more prominent than the last name "Stepp".

Cathy Stepp
Regional Administrator

**Baker & McKenzie LLP**

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September 06, 2017

Colonel Antoinette Gant
District Commander
U.S. Army Corps of Engineers
Louisville District
600 Dr. Martin Luther King Place
Louisville, Kentucky 40202

Via Email

United Minerals Company, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
Project Number LRL-2013-635-gjd

Dear Colonel Gant,

This letter is written as follow up to the ongoing discussions the Army Corps of Engineers' (the "Corps") Louisville District has been having with representatives of United Minerals Company, LLC ("UMC"), a wholly owned subsidiary of Peabody Energy Corporation ("Peabody"), with respect to the scope of the required National Environmental Policy Act ("NEPA") review in furtherance of the Corps' issuance of a Clean Water Act Section 404 permit for the Seven Hills Mine project near Elberfield, Indiana. UMC appreciates your continued engagement regarding this important permitting matter, including last week's meeting to discuss the status of Corps review of the project and UMC's proposed additional project enhancements and mitigation measures aimed at responding to remaining Corps concerns.

By letter dated October 27, 2016, I outlined for Colonel Beck the legal posture of the Corps' pending Section 404 permit review for the Seven Hills Mine project. It bears repeating that Corps regulations and long established Corps precedent makes clear that an Environmental Assessment ("EA") is the proper and "normally required" process for Corps review of Section 404 permits. See 40 CFR § 230.7(a). The Louisville District has consistently and steadfastly followed this legal mandate in each and every Section 404 permit review requested by coal companies operating in the Illinois Basin. In no cases to date has the Corps determined that potential impacts at a site were so significant as to justify the departure from its normal review process and require an Environmental Impact Statement ("EIS"). In past permit matters, the Corps has certainly deemed appropriate - again, consistent with its regulations, guidance and case law precedent - the implementation of appropriate mitigation measures to reduce anticipated project environmental impacts so as to avoid perceived

Baker McKenzie.

significant harm. Where required, these determinations have been documented in negotiated EAs with Findings of No Significant Impacts (“FONSI”) that impose the necessary limitations and conditions to address Corps concerns consistent with its regulations.

UMC has diligently and constructively followed the path for approval of its Section 404 permit for Seven Hills as clearly set out in the Corps regulations and as followed in permit after permit reviewed and approved by the Louisville District for other similar projects. Candidly, this has not been a necessarily easy process for UMC as the Company has been provided with no real guidance from, or productive engagement by, the Louisville District staff on mitigation requirements deemed acceptable for this project. In the absence of assistance or guidance from the District, UMC has nonetheless continued to propose and repropose additional mine plan revisions and mitigation measures for the Seven Hills Mine project that have further reduced the wetlands impacts by a third (from 510 acres to 348 acres), further reduced stream impacts by twenty percent (from 53,480 feet to 44,395), and avoided altogether adverse impacts to Pigeon Creek while increasing the undisturbed buffer along the Creek five-fold (from 120 feet to 580 feet). Even after the meeting last week, UMC, on its own initiative, proposed the “conditional approval” only of 140 acres of planned wetlands impacts and 9,000 linear feet of stream impacts, giving the Corps the ability to evaluate UMC’s project work, mitigation measures, and extent of indirect impact before allowing mining to proceed in these areas.

UMC is confident that the EA review and proposed mitigated FONSI at Seven Hills fully satisfies its NEPA obligations and requires Corps’ approval of the pending Section 404 permit. The essential character of the Seven Hills project site does not justify the extraordinary departure from Corps precedent required to support a first-of-its-kind mandate to complete an EIS. This was true when UMC proposed its original project plan and is unquestionably correct today after UMC has painstakingly – and with no real effort or support from District staff to find productive solutions – reworked the project and proposed materially more by way of avoidance and mitigation to respond to any and all Corps concerns.

UMC very much wishes to avoid any further legal process or dispute over the pending Section 404 permit application for its important Seven Hills Mine project. UMC believes that it has acted in good faith to develop a project that satisfies its legal obligations to the Corps and requires engagement by the Corps on final permit terms to bring this matter to appropriate resolution. UMC remains at your disposal to discuss any of these issues as you deem useful.

Yours sincerely,



John Watson
Partner

+1 312 861 2646
John.Watson@bakermckenzie.com



Cc: Bryce West
Chris Wittenauer



United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

September 22, 2017

Ms. Lee Anne Devine
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

UNITED MINERALS COMPANY, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
U.S. Army Corps of Engineers Project No. LRL-2013-635-gjd
Conditional Permit Approval

Dear Ms. Devine:

Please accept this letter as formal documentation of our proposal to include a permit condition on the above referenced application. This proposal was provided in an email sent to Colonel Gant by Kemal Williamson on September 1, 2017. As you are aware, prior to our meeting August 31, 2017 in Louisville we reevaluated the mining plan and significantly reduced the wetland impacts by an additional 144 acres. This change has been made with the intent of being able to move the permit forward with a robust Environmental Assessment. Sound scientific and engineering analysis, as well as, numerous past mining examples have been provided that demonstrate significant negative impacts to the adjacent wetlands are not expected.

In addition to the significant reduction in impacts and supporting analysis, an additional 140 acres of wetlands on the north end of the mining reserve has been identified and proposed for a restricted "Conditional" approval. This will reduce the wetlands initially proposed for impacts to approximately 200 acres and provide 4-5 years of mining at a 1M tons/year rate. During that time, the Corps can closely monitor whether or not significant indirect impacts occur and our performance on reclamation and mitigation. If the indirect impacts are significant and/or we are not performing the mitigation as required then the permit "Condition" is not met. As a result, Peabody is not allowed to continue mining into the 140 acres of wetlands shown on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and we can continue mining the adjacent 140 acres. An appropriate Adaptive Management Plan can be established to monitor for indirect impacts.

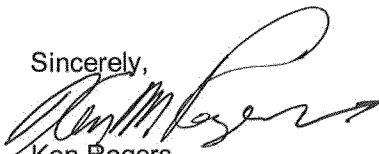
We believe the 'conditional approach' is very reasonable and should alleviate remaining concerns. Permit conditions are common practice in most all permits required for coal mining and are effective in addressing issues such as this.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
"Conditional" Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

If you have any questions or comments, I can be reached at **812.922.1044** or via email at **<Krogers@peabodyenergy.com>**. We look forward to continue working with you and others on this important project.

Sincerely,



Ken Rogers
Director Environmental Services
Authorized Representative

Enclosures

cc: Seven Hills Mine - Permit Binder (1x)



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

RECEIVED

MAY 17 2016

BY _____

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and

may impact downstream receiving waters, such as the Ohio River. The effects of multiple large scale surface mining operations and agricultural activities have increasingly taken a toll on the Pigeon Creek watershed. Project area aquatic resources, such as contiguous tracts of increasingly rare bottomland hardwood wetlands, filter out nutrients, and excess sediments and other pollutants to help prevent them from entering nearby tributaries. The loss of these project area aquatic resources would eliminate this function and its contribution to maintaining water quality in downstream waters, such as the Ohio River. Furthermore, the agencies have concerns that, based on the past performance of mitigation efforts in nearby watersheds, proposed efforts to offset impacts to project area aquatic resources may not prove successful.

The affected wetlands and other bottomland forest provide essential habitat for state endangered and federally listed species including Indiana bats (*Myotis sodalis*), northern long-eared bats (*Myotis septentrionalis*), evening bats (*Nycticeius humeralis*), cerulean warblers (*Setophaga cerulean*), northern harriers (*Circus cyaneus*), and copperbelly water snakes (*Nerodia erythrogaster neglecta*). All of these species and several state species of special concern have been documented within the project area. The agencies are concerned about the potential impact of the project on these species.

Indiana has lost eighty-five percent of its wetlands, and large remaining tracts such as those present at the project site are rare. In particular, forested wetlands are a declining resource. According to the National Wetland Reports by FWS, forested wetlands experience the greatest decline of all wetlands types. United Minerals asserts that the additional range of habitat types that would result from reclamation activities at the Seven Hills Mine site will be an improvement over existing conditions. However, given the high acreage of forested wetlands that would be lost, the time it takes for forests to mature, and the poor performance of mitigation on the nearby Somerville and North Millersburg mines, it is highly unlikely that the reclaimed areas will develop habitat that is more productive than what currently exists.

The agencies detailed comments follow.

Independent Utility

The Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine (LRL-2013-444-rjb), which is also operated by United Minerals. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine, are also described in the High Point application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would be considered to have independent utility. Therefore, the agencies' request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosures 1 and 2).

Significant Degradation

In accordance with the Clean Water Act Section 404(b)(1) Guidelines (the Guidelines), the agencies believe that this project as proposed may cause or contribute to a significant degradation of Pigeon Creek.¹ The preamble to the Guidelines states that discharges may not be permitted if they will have “significantly” adverse effects on various aquatic resources. In this context, “significant” and “significantly” mean more than “trivial.”

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Secondary impacts include effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.² Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.³

The table below summarizes the cumulative footprints of mining activities in the Highland-Pigeon Creek Watershed and the enclosed map graphically depicts those activities (See Attachment 1).

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Total	62,208	97

Within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations in the last 8 years. An additional, 555.86 acres of wetland impacts (including impacts to 463.83 acres of forested wetlands) and 113,187 feet of stream impacts have been identified on the proposed mine sites for the Seven Hills and High Point mines. In total, the permitted and proposed mining activities account for 18,762.6 acres of direct impact, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

¹ 40 CFR 230.1(c)

² 40 CFR 230.11(h)

³ 40 CFR 230.11(g)

The proposed loss of nearly 500 acres of forested wetlands from this project would will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of freshwater inflow to the Ohio River. Pigeon Creek is listed as impaired for *E. coli*, dissolved oxygen, impaired biotic communities and nutrients and the Ohio River is listed as impaired for *E. coli*, dioxin, total mercury and PCBs on Indiana's 303(d) list of impaired waters.⁴ Given the algal issues in the Ohio River in 2015, the agencies are also concerned about possible effects in the Ohio River with respect to safe drinking water, wildlife and recreation (see Attachment 2).

In addition to the localized impacts to water quality, the increase of nutrients and specifically nitrogen in watershed has had a demonstrated effect on water quality. The United States Geologic Survey published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The Highland-Pigeon Creek watershed was estimated as one of the watersheds to contribute more than 90% of its nitrogen to the Gulf.⁵ EPA's initial SWAT modeling, which does not include cumulative impacts of mining, indicates that the loss of these wetlands along Pigeon Creek would increase nutrient loads to the Ohio River by over 3,500 pounds annually and increase sediment loads by over 260,600 pounds annually.

Project Area Aquatic Resources

The agencies are concerned that the project's CWA Section 404 discharges may result in unacceptable impacts on the Ohio River, Pigeon Creek, and its forested floodplain wetlands. The bottomland hardwood forests within the Pigeon Creek floodplain are an important and productive habitat. In addition to the habitat value of natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain Indiana Department of Natural Resources (IDNR) wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMLD Development Schedules

⁵ Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

Wabash-Erie Canal and a portion of Pigeon Creek onsite is part of the former canal. Today, the creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as “an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the environment.”⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed also help to protect the quality of the Ohio River from nonpoint source pollution from urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River serves as a source of drinking water, hydroelectric energy, shipping route to the Mississippi River, recreation and fishing. There are presently several fish consumption advisories for the Ohio River.⁸

Endangered and Threatened Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), and the federally threatened northern long-eared bat (*Myotis septentrionalis*). An Indiana bat maternity colony from a known primary roost tree has been documented using the southern portion of the proposed project area for foraging, and bat survey results indicate the presence of an additional maternity colony which forages on the northern end of the permit area. Although it has not been addressed in the permit application, at least one northern long-eared bat maternity colony has also been documented in the project area; reproductively active females were captured during bat surveys. The proposed mining activity will temporarily or permanently eliminate approximately 690 acres of summer habitat for these species. The proposed restored forest will not become suitable habitat for many years, if ever.

The copperbelly water snake (*Nerodia erythrogaster neglecta*) is known to have reproducing populations along the Pigeon Creek corridor, with known records of individuals in the project area. This species is federally listed as threatened in the northern part of its range, but listing was precluded in southern Indiana due to the development of a Copperbelly Water Snake Conservation Agreement and Strategy, endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective in avoiding impacts to and conserving copperbelly water snake habitat. This permit application is the first action that the FWS is aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

The following species were also documented within the project area:

⁷ <http://www.evansvillegov.org/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

State endangered species: northern harrier, least bittern, black-crowned night heron, black tern, Henslow's sparrow, osprey, yellow-headed blackbird, short-eared owl, sedge wren, marsh wren, barn owl, Virginia rail, American bittern, and loggerhead shrike.

Waterfowl: Canada goose, gadwall, mallard, hooded merganser, red-breasted merganser, bufflehead, ruddy duck, wood duck, northern shoveler, lesser scaup, American wigeon, redhead, ring-necked duck, green-winged teal, common goldeneye, northern pintail, snow goose, canvasback, American black duck, tundra swan, greater scaup, cackling goose, white-winged scoter, common merganser, and mute swan.

Scope of NEPA Analysis

The NEPA analysis should include the entirety of the area proposed for mining, including both uplands and aquatic resources. As a result of the proposed Corps' action, there would be direct, indirect, and cumulative human health and environmental impacts beyond the regulated waters, including indirect or cumulative impacts that may be outside of the mine footprint. The NEPA analysis should extend outside of the regulated activity because the "*environmental consequences of the larger project are essentially products of the Corps permit action*".⁹ Further, based on potential impacts to aquatic resources and threatened or endangered species, sufficient Federal involvement exists to expand the scope of the NEPA analysis beyond the regulated activity.¹⁰ Based on the above, the agencies find that the scope of the NEPA analysis should extend outside of the regulated activity, based on potential direct, indirect, and cumulative impacts to resources.

As discussed above under *Independent Utility*, EPA recommends the scope of the NEPA analysis include both the Seven Hills Mine and the adjacent High Point Mine. The analysis should also consider other mines which may be connected actions¹¹ and/or similar actions.¹² Impacts from nearby mining operations should be analyzed in the same NEPA document.

Preparation of an Environmental Impact Statement

NEPA states that major federal actions which could significantly affect the quality of the human environment require an EIS be prepared. The Council on Environmental Quality (CEQ) has defined "significantly" by two criteria: *context* and *intensity* of impacts of the proposed project.¹³ Seven Hills Mine would cause significant environmental impacts, and, therefore, an EIS should be prepared. We recommend consideration of the following factors regarding significance:

- **Cumulative Impacts:**¹⁴ The proposed mine and the other mining activities would likely lead to impacts to the environment and human health that are cumulatively significant. Mining in this watershed has continued over the last 100 years. A

⁹ 33 CFR Part 325, Appendix B Section 7(b)(2)

¹⁰ 33 CFR 325 Appendix B, Section 7(b)(2)(iv)

¹¹ 40 CFR § 1508.25(a)(1)

¹² 40 CFR § 1508.27

¹³ 40 CFR § 1508.27

¹⁴ 40 CFR § 1508.27(b)(7)

cursory examination of surface coal mining projects within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) in the last 8 years shows that over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations. Additionally, 555.86 acres of wetland and 113,187 feet of stream have been identified on the proposed mine sites, which include Seven Hills and High Point mines. All permitted and proposed mining activities in the last 8 years directly affect 18,762.6 acres, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

Both particulate matter and hazardous air pollutant levels would be expected to increase as a result of continued mining in the area, exacerbating human health problems related to poor air quality. Nearby communities also experience cumulative and multiple impacts related to the mining and processing of coal, such as noise and vibration. Additionally, the eventual combustion of coal mined at Seven Hills and High Point mines would release high levels of greenhouse gas emissions and contribute to climate change. Therefore, because the impacts from the Seven Hills Mine and other proposed mines could potentially have cumulatively significant impacts on human health and the environment, an EIS should be prepared.

- Unique characteristics of the geographic area:**¹⁵ The mine site includes areas which the agencies consider to be of significant value: Pigeon Creek and the bottomland hardwoods in the Pigeon Creek watershed. The subwatershed (12-digit HUC Clear Branch Pigeon Creek) is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans. The fact that eighty five percent of the wetland resources once present in Indiana have been lost or altered makes remaining wetlands especially critical resources for conservation.¹⁶ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits, such as maintaining the quality of drinking water and controlling flooding, and in environmental benefits, such as providing habitat for wildlife, including threatened and endangered species. The resources proposed for impact onsite are used by an endangered species, a threatened species, and a species listed as threatened in its northern range. Based on the scale of the proposed project's impacts to important aquatic resources and other ecologically critical areas, an EIS should be prepared.
- Public Health or Safety:**¹⁷ Living near proposed surface coal mines increases exposure to pollutants and other hazards, raising human health concerns, such as cardiopulmonary diseases and cancers, respiratory disease, kidney disease, hypertension, and issues related to psycho-social stressors.¹⁸ Environmental impacts

¹⁵ 40 CFR § 1508.27(b)(3)

¹⁶ Status and Trends Report on State Wetland Programs in the United States.

¹⁷ 40 CFR § 1508.27(b)(2)

¹⁸ Hendryx, M., and Ahrem, M. *Relations between health indicators and residential proximity to coal mining in West Virginia*. American Journal of Public Health, 2008; 98: 669-671, Walker, E., PhD and Payne, D., MPH *Health Impact Assessment of Coal and Clean Energy Options in Kentucky*. Rep. Kentucky Environmental Foundation, n.d. Web 19 Nov. 2015

from surface coal mining, processing, and burning that contribute to human health include, but are not limited to, water contamination, air emissions, noise, vibration, and flooding. Federally enforceable state regulations prohibit visible emissions from mining activities from crossing property lines,¹⁹ though mine blasting may not be able to meet that requirement. Demographic data indicate a high percentage of children living in the area are under the age of five. Children are particularly vulnerable to impacts from exposures to air pollutants. Environmental data show high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. We are concerned about cumulative impacts to the surrounding communities given that Seven Hills Mine would be located near other operating and proposed mines, further exacerbating existing exposures. Based on the potentially significant impacts to public health and safety, an EIS should be prepared.

- **Threatened and Endangered Species:**²⁰ As discussed above, the proposed Seven Hills Mine is within the range of the endangered Indiana bat (*Myotis sodalis*) and the threatened Northern long-eared bat (*Myotis septentrionalis*) and these species have been documented using the site. Additionally, the Copperbelly watersnake (*Nerodia erythrogaster neglecta*) is known to have breeding populations along Pigeon Creek. Because there are potentially significant impacts to threatened or endangered species, an EIS should be prepared.

The agencies note that preparation of an EIS for a surface coal mine would not set a new precedent for the analysis of impacts to human health and the environment. EISs have been prepared for coal mines with similar scopes of impacts, such as:

- Fort Worth Corps District is currently considering a Regional Draft EIS for Surface Coal and Lignite Mining in Texas (Draft EIS CEQ #20150191);
- Fort Worth Corps District prepared an EIS for the Rusk Mine in Texas (Final EIS CEQ #20110148);
- Fort Worth Corps District prepared an EIS for the Three Oaks Mine in Texas (Final EIS CEQ #20030199); and
- Louisville Corps District previously issued an EIS for the Delta Coal Mine Complex in Illinois (Final EIS CEQ #19960416).

The NEPA process allows the Corps to fully consider potential impacts and measures to avoid, minimize, and mitigate those impacts as a means to achieve more informed decision-making and better project outcomes. The scope of analysis for the NEPA document on the proposed Seven Hills Mine should cover the entire mine site, including both uplands and aquatic resources, and the entirety of High Point Mine. Due to potentially significant cumulative impacts, adverse impacts to threatened and endangered species, impacts to unique characteristics of the geographic area, and risks to public health and safety, the agencies believe the Corps should prepare an EIS.

¹⁹ 326 Indiana Administrative Code 6-4-2

²⁰ 40 CFR§ 1508.27(b)(9)

Mitigation and Monitoring

The applicant proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 19.81 acres palustrine emergent, 13.43 acres of palustrine emergent, and 1.04 acres of palustrine unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial stream, using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.²¹ An in-depth discussion regarding mitigation is premature without first considering additional avoidance and minimization efforts to help ensure that proposed discharges represent the least environmentally damaging practicable alternative. However, the agencies have reviewed the proposed on-site and off-site compensatory mitigation plans and offer the following general comments at this time to help improve the mitigation plan.

The mitigation plan does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, it is imperative to take connectivity into account when designing mitigation.

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. Forested wetlands experience the greatest decline of all wetland types and are extremely difficult to restore or create.

EPA and FWS recommend that the applicant be required to mitigate for bottomland hardwood forest at a ratio of 4:1. This ratio is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.²² For mitigation to be considered successful, performance standards in the mitigation plan would have to be achieved. It is our understanding that the hydrology will not be re-established until the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (rather than the mitigation proposed at the "avoided" areas).

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and success in generating functional lift is often

²¹ 40 CFR 230.91(c)

²² 40CFR 230.93(f)(2)

elusive. The FWS asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland forest associated with the North Millersburg Mine. The finished topography on much of the reclaimed area was too high in elevation to function as bottomland forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments looks more like rolling hills than floodplain. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Final Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally done by applying appropriate ratios so that the amount of compensation will be adequate to offset the authorized impacts even if the mitigation is not 100% successful.

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the proposed mine boundary and discusses how restoration in areas east of Pigeon Creek will allow for streams and wetlands to interact hydrologically during periods of overbank flooding. However, it is unclear how this interaction will be affected given the existing levee that runs along the east edge of Pigeon Creek, directly west of a portion of the proposed on-site mitigation. The floodway modification plan for this area is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for forested wetland based on the referenced study. Additional clarification on the determination of 2,500 acres as the contributing cumulative watershed is needed. The mitigation plan does not detail how the proposed stream and wetland mitigation will tie in with aquatic resources adjacent to the site boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results from attempting to restore streams in mined areas. It is likely that the intermittent and ephemeral streams would not have adequate flow, which will impact existing uses in the compensatory mitigation streams. Considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

In addition to the on-site reclamation, the applicant proposes off-site mitigation on 575.9 acres on Greathouse Island, an abandoned oxbow of the Wabash River, in Posey County, Indiana. Proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 258.9 acres of existing forested wetland. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact, and while it may provide some benefits to the Ohio River, to which the Wabash River is a tributary, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. Permittee-responsible mitigation (PRM) projects are designed to offset specific impacts, and are therefore more likely to reduce the severity of project site impacts. The off-site PRM proposed on Greathouse Island appears to be intended to offset functional losses, however, they would not occur within the project footprint and would not result in functional gains within the watershed. According to the application, the enhancement areas will be selectively harvested to reduce the existing canopy cover by 50 percent. It is

unclear how harvesting trees from an existing forested wetland will provide mitigation for forested wetland impacts. The instability of the proposed site is also of concern. This site is a remnant meander of the Wabash River that is part of a dynamic system within a floodplain. Upstream hydrologic processes and perturbations will control hydrology in this area, including reactivating former channels and influencing channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity.

The applicant claims that the off-site mitigation will provide additional habitat for the federally endangered Indiana bat, as well as several other bat species. While the mitigation, if successful, will provide habitat for the Indiana and northern long-eared bat, it will take several years before it is suitable foraging habitat and many more years before it becomes suitable roosting habitat, if ever. Also, the off-site mitigation will not provide any benefit to the known maternity colonies in the proposed project area, as both Indiana and northern long-eared bats display high site fidelity, returning to the same roosting habitat year after year.

While the objectives of the mitigation area are to provide flood, sediment, and nutrient storage for the Wabash River, there is no indication of the degree or level of functional lift provided compared to existing conditions, how that lift would benefit the watershed of impact or the likelihood of success given the activities proposed. Because it will take some years before the off-site mitigation is established, and it is nearly 40 miles and two watersheds away from the impact area, it is unlikely to offset either the temporal or cumulative loss of wetlands. EPA and FWS recommend the applicant explore mitigation opportunities within the impacted watersheds specified in the IDEM June 2003 Highland-Pigeon Creek Watershed Management Plan.

Monitoring and Long Term Management

The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas. The Guidelines state that “financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments”.²³ The increase in coal companies filing for Chapter 11 Bankruptcy²⁴ and the inherent risk in re-creating streams and wetlands on-site in the post mining landscape necessitate the establishment of appropriate financial assurances.

To comply with the Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs and annual cost estimates for these needs, and should identify the funding mechanism that will be used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

²³ 40 C.F.R. §230.93(n)(2)

²⁴ <http://www.businessfinancenews.com/24344-is-arch-coal-inc-on-the-verge-of-chapter-11-bankruptcy/>

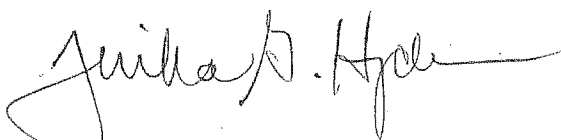
An adaptive management plan is provided, however, it does not include a root cause analysis or describe necessary corrective actions if insufficient hydrology makes stream restoration infeasible.

As part of the monitoring program for affected and reconstructed streams, physical, chemical and biological monitoring should be required. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

Thank you for your consideration of our comments and recommendations to aid in the evaluation of project impacts to environmental resources within the Pigeon Creek Watershed, consistent with the requirements of the NEPA, CWA and ESA. We look forward to discussing these comments with you. Prior to the closing of the public comment period additional CWA Section 404 comments will be forthcoming. Please contact Wendy Melgin from the U.S. Environmental Protection Agency at melgin.wendy@epa.gov or (312) 886-07745 and Marissa Reed from U.S. Fish and Wildlife Service at marissa_reed@fws.gov or (812)334-4261 with any questions.

Sincerely,



Tinka Hyde
Director, Water Division
U.S. Environmental Protection Agency



Scott Pruitt
Field Supervisor
U.S. Fish and Wildlife Service

Enclosures
Attachments

cc: Martha Clark-Mettler, IDEM
David Carr, IDEM
LeAnne Devine, USACE-Louisville District
George DeLancey, USACE-Louisville District
Bob Krska, USFWS-Regional Office, Bloomington, MN
Jason Miller, USFWS-Headquarters, Falls Church, VA

Enclosure 1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

NOV - 6 2013

REPLY TO THE ATTENTION OF:
 WW-16J

U.S. Army Corps of Engineers, Louisville District
 ATTN: Mr. George DeLancey, CELRL-OP-FW
 P.O. Box 489
 Newburgh, Indiana 47629-0489

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Mr. DeLancey:

The U. S. Environmental Protection Agency has reviewed the preliminary Clean Water Act (CWA) Section 404 permit application (permit application) for the subject project. Under United Minerals Company, LLC's preliminary proposal, approximately 458.2 acres of wetlands (of which 401.5 acres are forested) and 31,762 linear feet of streams, would be impacted for the construction of the 2,351.2-acre Seven Hills Mine in the Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 1,370.3 acres of the site has been previously mined. Two distinct previously mined areas lie in the eastern and southern portions of the permit area. We offer the following comments based on our review of the preliminary permit application.

Land Use/Existing Conditions

A November 2010 letter from the United States Fish and Wildlife Service (USFWS) to the Indiana Department of Natural Resources (IN DNR) commenting on the Surface Mining Control and Reclamation Act (SMCRA) permit application for the Seven Hills Mine, conveyed serious concerns about proposed impacts to wetlands and other bottomland forest along Pigeon Creek that provide abundant habitat for numerous and significant wildlife species, including migratory birds, the Copperbelly water snake (*Nerodia erythrogaster neglecta*), and the federally endangered Indiana bat (*Myotis sodalis*). In addition to the habitat value of these natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.¹ Forested wetlands are ecologically important systems and represent some of the most diverse, complex, and productive freshwater wetlands in the Nation. In spite of their high value, these systems have experienced significant decline in

¹ <http://water.epa.gov/type/wetlands/bottomland.cfm>

area throughout the United States. Between 2004 and 2009, forested wetlands declined by an estimated 633,100 acres. This trend in forested wetlands loss only heightens the significance of any additional loss of these resources.²

United Minerals Company, LLC (UMC) asserts that the additional range of habitat types that would result from reclamation at the Seven Hills Mine site will be an improvement over existing conditions; however, this assertion is not supportable given the high acreage of forested wetlands that would be lost.

Alternatives Analysis

The preliminary application information does not provide an adequate range of alternatives that avoid and minimize impacts to aquatic resources at the project site to the maximum extent practicable under the CWA Section 404(b)(1) Guidelines (Guidelines). The amount of effort and level of detail included in the analysis must be commensurate with the level of aquatic resources impacted, which EPA believes to be significant in this case. EPA strongly recommends the applicant provide alternatives that include considerable avoidance of valuable bottomland wetland habitat. For example, UMC should consider alternatives that include mining from the eastern portion of the site (which includes previously mined areas) towards the west, up to the bottomland wetland areas (leaving a sufficient buffer), and augering under the wetlands. UMC makes a general statement in the permit application that “historically augering activities have proven to not be cost effective in most circumstances.”

EPA understands that more coal can be extracted using the open pit method than the augering method; however, no information is provided to demonstrate that augering is cost prohibitive specific to this project. The practicability of each alternative should be considered in light of cost, logistics, and available technology and evaluated at a level that reflects the significance of the resources to be impacted.

Cumulative Impacts

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines, the applicant should prepare a cumulative impacts analysis that details changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct and indirect impacts from previous and current actions as well as impacts from future actions as a result of changes in surface and groundwater hydrology.

The cumulative impacts analysis should also discuss potential ecological impacts associated with the loss of forest cover and forest fragmentation along the Pigeon Creek bottomlands. As mentioned above, USFWS expressed this as a serious concern in its November 2010 letter to IN DNR. The mining activity would temporarily or permanently eliminate at least 600 acres of summer habitat for the endangered Indiana bat (*Myotis sodalis*) and valuable habitat for other

² United States Fish and Wildlife Service. 2011. *Status and Trends of Wetlands in the Conterminous United States 2004 to 2009*.

species such as the Copperbelly water snake (*Nerodia erythrogaster neglecta*). EPA understands that listing of this species in southern Indiana was precluded due to development of a *Copperbelly Water Snake Conservation Agreement and Strategy* (Agreement) endorsed by the USFWS, IN DNR, and the Indiana Coal Council, which is now expired. According to the USFWS, since the expiration of the Agreement, all parties have continued to implement the goals of the Agreement voluntarily, to avoid and conserve Copperbelly water snake habitat. This permit application is the first USFWS is aware of that would not follow the tenants of the Agreement.

A Clean Water Act Section 404 permit was issued for the nearby Liberty Mine, LRL-2010-218-gjd, in April 2012. The permit authorized impacts to 8,948 feet of perennial streams, 5,183 linear feet of intermittent streams, 6,212 linear feet of ephemeral streams, 35.3 acres of forested wetlands, 63.3 acres of emergent wetlands, and 0.8 acre of scrub-shrub wetlands. In addition, the recently proposed High Point Mine (LRL-2013-444-rjb) is approximately 3084.6 acres in size and abuts the proposed site. According to Robert Brown of your office, the proposed High Point Mine would impact approximately 27 acres of wetlands and 63,000 linear feet of streams. This mine would also be operated by UMC. EPA requests that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. They are abutting UMC mines, appear to be at similar stages of development in the permitting process, and the preparation plant serving both operations would be constructed on the High Point Mine site.

Environmental Justice Concerns

Based on the limited information provided in the permit application and other environmental and demographic data, EPA believes the proposed mine may raise environmental justice concerns. Demographic data indicate there are both high percentages of low-income individuals and children under the age of five, who are particularly vulnerable to impacts from mining operations. Environmental data shows high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. EPA is concerned that communities would potentially be disproportionately impacted by the proposed mine. Further, EPA is concerned about cumulative impacts to the surrounding communities, given that the proposed mine would be located near an operating mine, further exacerbating existing exposures to sensitive populations.

Preparation of an Environmental Impact Statement

Section 102(2)(C) of NEPA identifies major federal actions that “significantly” affect the quality of the human environment requiring an environmental impact statement (EIS). In regulations the Council on Environmental Quality promulgated under NEPA, ‘significantly’ is defined by two criteria: context and intensity of impacts of the proposed project.³ ‘Context’ refers to the affected environment in which a proposed action would occur and ‘intensity’ means the degree to which the proposed action would include one or more of the factors listed below, among others. The Seven Hills Mine, as currently proposed, appears to exceed thresholds for significance based on the context and intensity of the project. Therefore, EPA strongly recommends that the Corps prepare an EIS for this project for the following reasons:

³ 40 CFR § 1508.27

- Unique characteristics of the geographic area:** The Seven Hills Mine would impact approximately 458.2 acres of wetlands and 31,562 linear feet of streams. The impacted subwatershed is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans.⁴ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits, such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or altered makes wetlands especially critical resources for conservation.⁵ Because of the scale of the proposed project's impacts to ecologically critical areas, EPA views the preparation of an EIS as appropriate.⁶
- Public Health or Safety:** As discussed above, the proposed mine may raise environmental justice concerns. Adjacent communities include a high number of low-income individuals and a high number of children under the age of five. These populations are more sensitive to impacts and potentially experience unique exposure pathways. Communities may be exposed to multiple mine-related impacts, including fugitive dust, noise, and water discharge. Based on this, the potential for public health and safety risks are increased and an EIS should be prepared.⁷
- Cumulative Impacts:** As mentioned in the comments on Cumulative Activity, Seven Hills Mine would be located near an active mine and abutting a proposed mine. Additional mining activities would likely lead to impacts that are cumulatively significant.⁸ The cumulative impacts from the Seven Hills Mine and other proposed mines could potentially have significant impacts on human health and the environment, and would be grounds for the preparation of an EIS.
- Threatened and Endangered Species:** As discussed above, the proposed Seven Hills Mine is within the range of Indiana bat (*Myotis sodalis*) maternity roosting habitat (endangered) and the Copperbelly watersnake, which has been previously proposed for inclusion on the federal threatened species list for this area. Potential impacts to threatened or endangered species are considered grounds for the preparation of an EIS.⁹

As discussed above, EPA believes the proposed project should be analyzed in conjunction with other similarly proposed projects in the area, including the High Point Mine. The operation of both mines relies on shared infrastructure, including the preparation plant, which is located within the proposed footprint of High Point Mine. This qualifies the permitting of both mines as connected actions,¹⁰ which should be analyzed in one NEPA document.

⁴ <http://ai.org/idem/nps/3241.htm>

⁵ Indiana Department of Natural Resources. 1996. *Indiana Wetlands Conservation Plan*.

⁶ 40 CFR § 1508.27(b)(3)

⁷ 40 CFR § 1508.27(b)(2)

⁸ 40 CFR § 1508.27(b)(7)

⁹ 40 CFR § 1508.27(b)(9)

¹⁰ 40 CFR 1508.25(a)(1)

Mitigation and Monitoring

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.¹¹ An in-depth discussion regarding mitigation is premature given the applicant first needs to adequately address avoidance and minimization. However, per the Corps' request, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following general comments at this time to help improve the mitigation plan.

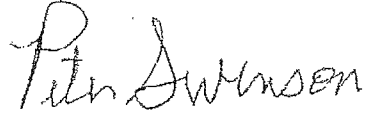
- The applicant needs to document how avoided stream reaches will be preserved or affected during mining and what that will mean for reconstructed stream reaches in terms of flow regime.
- The applicant needs to explain the rationale behind selecting the proposed performance goals of EPA Rapid Bioassessment Protocol (RBP) scores of at least 115 for intermittent stream mitigation reaches and at least 110 for ephemeral stream mitigation reaches. EPA recommends that the applicant locate reference reaches in the area to use as a guide to develop stream mitigation goals. As you know, reference conditions in the region can be used to scale the assessment to the "best attainable" condition for mitigation reaches.
- The mitigation ratio proposed for forested wetland is 2:1. The proposed mitigation ratio is too low given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. EPA recommends that the applicant be expected to mitigate for bottomland hardwood forest at a ratio of 4:1.
- The off-site wetland mitigation proposal is in need of significant improvement. More detail on the existing conditions of the mitigation areas, especially those proposed for preservation and enhancement, is necessary to determine the merit of the proposal.
- The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas.
- As part of the monitoring program for affected and reconstructed streams, biological monitoring should be required to ensure there is no degradation to the communities that inhabit the streams. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

In conclusion, we strongly recommend that the Corps consider our recommendation to prepare an EIS for this project and our comments above to protect the significant resources within the Pigeon Creek bottomlands. Thank you for the opportunity to review the preliminary application for the Seven Hills Mine. We look forward to discussing these comments with you. Please

¹¹ 40 CFR 230.91(c)

contact Melissa Blankenship of our office at (312) 886-6833 or (503) 326-5020 with any questions.

Sincerely,

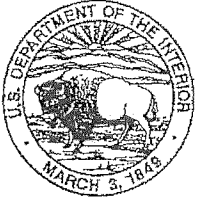
A handwritten signature in dark ink, appearing to read "Peter Swenson". The signature is fluid and cursive, with the first name "Peter" and last name "Swenson" clearly distinguishable.

Peter Swenson, Chief
Watersheds and Wetlands Branch

cc: David Carr, IDEM
Scott Pruitt, USFWS-Bloomington
James Townsend, USACE-Louisville District

Enclosure 2

Elizabeth Ful/Flie

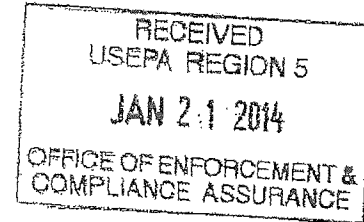


United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 10, 2014



Mr. George DeLancey
U.S. Army Corps of Engineers
CELRL-OP-FW
P.O. Box 489
Newburgh, IN 47629-0489

Dear Mr. DeLancey:

This responds to your letter of August 13, 2010 requesting U.S. Fish and Wildlife Service (FWS) comments on a permit application (LRL-2013-635) for the United Minerals Company, LLC proposed Seven Hills Mine (S-00357) in Warrick County, Indiana.

These comments are consistent with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service's Mitigation Policy, and the Indiana Coal Mining Regulatory Program, Section 310 IAC 12-3-107.

The proposed permit area covers 2351 acres. The proposed water resource impacts include over 31,762 feet of stream channel (2,589 feet ephemeral, 28,973 feet intermittent, and 200 feet perennial), approximately 458 acres of wetlands (401.5 forested, 4.45 emergent, and 52.15 shrub), and 29 acres of open water.

The permit area contains a combination of undisturbed bottomland along Pigeon Creek, including approximately 7,876 feet of the Pigeon Creek channel, and previously mined land in the North Millersburg, South Millersburg and Ayrshire mines. Most of the previously mined land has been reclaimed to a mixture of forest, wildlife land and agricultural land.

Wildlife Habitat

The affected wetlands and other bottomland forest provide abundant habitat for numerous and significant wildlife species, including migratory birds, Indiana bats (*Myotis sodalis*), Northern long-eared bats (*M. septentrionalis*), and the copperbelly water snake (*Nerodia erythrogaster neglecta*). We do not have a comprehensive bird species list for the permit area, however bird surveys by Audubon Society members in the Buckskin Bottoms area north (upstream) of the

permit area reported over 180 species of birds including 9 species listed at that time as State-endangered species.

An Indiana bat maternity colony from a known primary maternity roost tree has been documented using the southern portion of the proposed permit area for foraging, and bat survey results suggest the presence of an additional maternity colony which forages on the northern end of the permit area. The proposed mining activity would temporarily or permanently eliminate approximately 690 acres of summer habitat for this species and restored forest will not become suitable habitat for many years.

At least one Northern long-eared bat maternity colony has also been documented using the permit area with the capture of reproductively active females during bat surveys. Northern long-eared bats generally require similar summer habitat to that of Indiana bats, therefore the proposed mining activity would impact approximately 690 acres of habitat for this species.

The copperbelly water snake is known to have reproducing populations along the Pigeon Creek corridor. Listing in southern Indiana was precluded due to development of a Copperbelly Water Snake Conservation Agreement and Strategy endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective at avoiding and conserving copperbelly water snake habitat. This permit application is the first action we are aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

Mitigation

A thorough review of the proposed mitigation has not been conducted; however, the FWS asserts that wetlands of this magnitude and in this landscape location cannot be adequately restored based on the failure of previous efforts associated with the North Millersburg Mine. The North Millersburg mined land on the east side of the Pigeon Creek floodplain was to have been restored to its pre-mining condition of bottomland forest, however the actual restoration consisted chiefly of a mixture of upland fields, upland non-forested wildlife habitat and large, shallow permanent impoundments.

Cumulative Impacts

The proposed Seven Hills Mine, in combination with the two previous Millersburg Mines, would permanently or temporarily eliminate the vast majority of approximately 4000 acres of habitat along the Pigeon Creek corridor. As previously stated in this letter, the bottomland forest in the North Millersburg permit area was permanently lost. In addition, the newly proposed High Point Mine would impact approximately 2,500 acres of wildlife and forest habitat, including 27 acres of wetlands and 63,000 linear feet of streams.

A November 2013 letter from the U.S. Environmental Protection Agency (EPA) to the U.S. Army Corps of Engineers (Corps) requests that the Corps treat the High Point Mine and the Seven Hills Mine as a single project. The FWS supports this request since the mines have overlapping permit boundaries and will share a coal processing plant.

Endangered Species

The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*), sheepsnose mussel (*Plethobasus cyphus*) and the northern long-eared bat (*M. septentrionalis*), a species proposed as endangered under the Endangered Species Act. The sheepsnose mussel is restricted to the Ohio River and will not be impacted by the proposed mining operation.

As stated previously, there is known summer habitat for Indiana and northern long-eared bats present throughout the permit area, and the proposed mining operation will eliminate a significant amount of habitat for these species. In accordance with our national biological opinion issued to the Office of Surface Mining, United Minerals Company developed an Indiana Bat Protection and Enhancement Plan (PEP) outlining measures to minimize take of Indiana bats. To date, the northern long-eared bat has not been addressed.

The northern long-eared bat was proposed for federal listing under the ESA on October 2, 2013. Species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against take applies. The final listing decision for the northern long-eared bat is expected in October 2014. This could cause project delays, since potential adverse effects to the northern long-eared bat have not been previously addressed. Therefore, the FWS strongly encourages applicants to address the northern long-eared bat while it is proposed for listing. Interim guidance on addressing impacts to northern long-eared bats can be found on online at <http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>

In conclusion, the FWS continues to oppose a mining plan that will substantially alter the Pigeon Creek bottoms and result in hundreds of acres of wetland impacts. We recommend that the mining operation be altered to avoid mining disturbance in existing forest and wetland habitat in the Pigeon Creek floodplain.

Due to the extensive wildlife habitat proposed under this mining plan, and the extent of cumulative impacts of mining in the Pigeon Creek bottomland corridor, we believe that development of an Environmental Impact Statement is appropriate.

The FWS considers the Pigeon Creek floodplain to constitute a productive and valuable public resource which serves significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting habitat for aquatic and land species. As defined by the Section 404(b)(1) Guidelines, we consider the site to be a Special Aquatic Site that possesses special ecological characteristics of productivity, habitat, wildlife protection and

Page 4 of 4

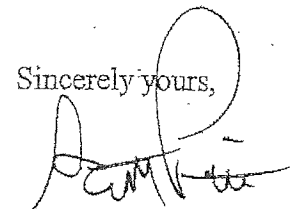
other important and easily disrupted ecological values. Therefore, the U.S. Fish and Wildlife Service requests that this permit be denied.

Pursuant to Part IV, Paragraph 3(a) of the Memorandum of Agreement Between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act dated December 21, 1992, it is the opinion of the Department of the Interior that the project may result in substantial and unacceptable impacts to aquatic resources of national importance.

We are providing this letter to reserve the option to elevate this individual permit action if significant differences remain between our agencies over the disposition of this permit, in accordance with the Memorandum of Agreement (MOA) between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act, dated December 21, 1992. Pursuant to Part IV, Paragraph 3(b) of the MOA, it is the opinion of the Department of the Interior that the project will result in substantial and unacceptable impacts to aquatic resources of national importance.

For further discussion, please contact Marissa Reed at (812) 334-4261 ext. 1215 or marissa_reed@fws.gov.

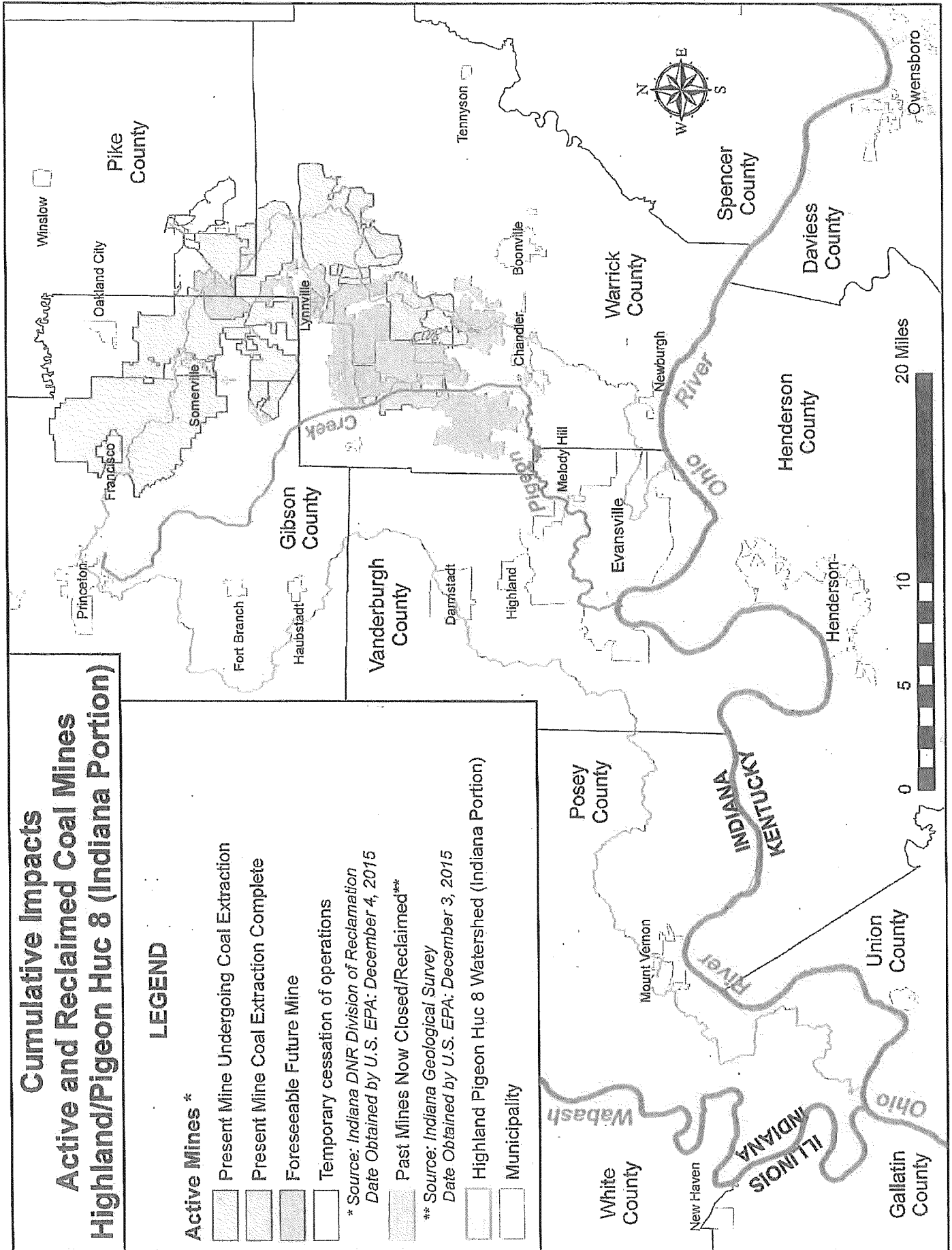
Sincerely yours,



Scott E. Pruitt
Field Supervisor

cc: Ramona Briggeman, IDNR Division of Reclamation, Jasonville, IN
Eric Langer, IDNR Division of Reclamation, Jasonville, IN
✓ Melissa Blankenship, US EPA, Chicago, IL

Attachment 1



Attachment 2

October 2015 Microcystin Concentrations and Proximity to Drinking Water Intakes

LEGEND

- Microcystin Concentrations Exceeds EPA and IDEM Thresholds for Drinking Water and Recreation
- Microcystin Concentrations Below EPA and IDEM Thresholds for Drinking Water and Recreation

N Non Detects

⊗ Public Water Supply Intakes

Highland Pigeon Huc 8 Watershed (IN Portion)

Mainstem Pigeon Creek Floodplain Wetlands *

Forested Wetlands (4461 Acres)

Other Wetland Types (1709 Acres)

Open Water (255 Acres)

* Source of Wetland Data: National Wetland Inventory, USFWS

I N D I A N A

I L L I N O I S

Wabash River

Mount Vernon
WATER WORKS

New Haven

Uniontown Lock and Dam

MORGANFIELD
WATER WORKS

K E N T U C K Y

Ohio River

HENDERSON MUNICIPAL
WATER & SEWER

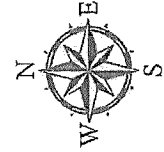
Henderson

Evansville

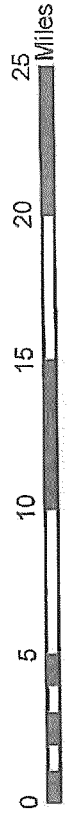
Newburgh 59.4 ug/L

Newburgh Lock and Dam

Ohio River



Owensboro



Winslow

Princeton

Francisco

Oakland City

Owensville

Fort Branch

Spurgeon

Somerville

Mackey

Haubstadt

Cynthiana

Elberfeld

7 Hills Mine Site

Damstadt

Chandler

Boonville

Tennyson

May. 2. 2016 2:51PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 14 2016

REPLY TO THE ATTENTION OF:

WW-16J

Colonel Christopher G. Beck
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Comments on Public Notice LRL-2013-635-GJD; Proposed Seven Hills Mine,
Warrick County, Indiana.

Dear Colonel Beck:

The U.S. Environmental Protection Agency has reviewed the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service (FWS) (Enclosure 1). As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

Based on our review of the previous and currently available information, and pursuant to Part IV, paragraph 3(a) of the 1992 CWA Section 404(q) Memorandum of Agreement between the EPA and Department of the Army, the EPA is hereby notifying the U.S. Army Corps of Engineers (Corps) that this project may have substantial and unacceptable impacts on aquatic resources of national importance.

The proposed Seven Hills project would mine through over 460 acres of floodplain forested wetlands and 10 miles of streams tributary to Pigeon Creek. From its headwaters, Pigeon Creek flows approximately 50 miles through the project area and bisects downtown Evansville, before joining the Ohio River. The EPA considers Pigeon Creek, its floodplain forested wetlands, and the Ohio River to be aquatic resources of national importance. Project area aquatic resources consist of contiguous tracts of increasingly rare floodplain forested wetlands. These wetlands are diverse and productive systems that are located on floodplains and inundated by flood waters. The Pigeon Creek floodplain forested wetlands filter nutrients, excess sediments and other

pollutants from Pigeon Creek before it enters the Ohio River. The loss of these project area aquatic resources would also reduce habitat and the floodplain's ability to attenuate and store flood waters.

The CWA Section 404(b)(1) Guidelines (Guidelines) provide the substantive environmental criteria against which this Section 404 permit application must be evaluated. Based on our review of the public notice and associated permit application materials, the applicant has not demonstrated compliance with several aspects of the Guidelines. These concerns are outlined below and described in detail in the attachments.

40 CFR Part 230.10(a) Alternatives Analysis

Fundamental to the Guidelines is the premise that no discharge of dredged or fill material may be permitted if a practicable alternative to the proposed discharge exists that would have a less adverse impact on the aquatic environment.¹ The Seven Hills Mine would abut United Minerals' proposed 3,085 acre High Point Mine. As proposed, these mines would share coal slurry facilities and other common features. Haul roads and other features that were proposed as components of the High Point Mine are designed to serve both mines and, in certain cases, some only serve the Seven Hills Mine. The Surface Mining Control and Reclamation Act permit application for the Seven Hills Mine also includes portions of the High Point operation in the mine boundary. Evaluating these operations separately limits the analysis of alternatives, including opportunities for a more complete evaluation of additional practicable alternatives that reduce or eliminate significant impacts to the floodplain forested wetlands and other aquatic resources on the Seven Hills Mine site. Therefore, the EPA reiterates the request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project.

The Guidelines provide a rebuttable presumption that less damaging practicable alternatives exist. In its application, United Minerals highlights that 17 billion tons of recoverable coal remain in Indiana and 130 billion tons occur within the Illinois Coal Basin, which includes Indiana coal. Based on the information provided by United Minerals, EPA does not believe the applicant has demonstrated that the Seven Hills site is the least environmentally damaging practicable alternative. For example, United Minerals should provide a comparative evaluation of the environmental impacts associated with additional alternatives within the same coal basin that would meet the basic project purpose and entail recovery from other coal reserves and holdings that it owns or that could reasonably be obtained through a parent company or other contractual relationships.

We look forward to continuing to work with the Corps and applicant to explore practical, cost-effective alternatives to reduce the environmental impacts of the project as currently proposed. Attachment 1 and 2 respectively provide detailed comments on the alternatives analysis and cumulative impacts analysis.

¹ 40 CFR Part 230.10(a)

40 CFR Part 230.10(b) and (c) Water Quality and Significant Degradation

The Guidelines state that a discharge of dredged or fill material may not be permitted if it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standards,² or causes or contributes to significant degradation of the waters of the United States.³ The EPA is concerned that the proposed loss of project area floodplain forested wetlands and tributaries would increase nutrient loading and sedimentation, causing or contributing to the significant degradation of Pigeon Creek and ultimately affecting the quality of water of the Ohio River.

The effects of multiple large scale surface mining operations and other stressors have increasingly taken a toll on Pigeon Creek. The loss of nearly 500 acres of floodplain forested wetlands and 10 miles of streams at the Seven Hills Mine site would add to the nearly 400 acres of wetlands and 10 miles of stream impacts that have already been permitted for surface coal mining operations within the Highland-Pigeon Creek watershed in the last 8 years. The total wetland impact proposed for the Seven Hills Mine site is larger than the total wetland impacts for all permitted coal mines in the Highland-Pigeon Creek Watershed. Results from initial water quality modeling conducted by the EPA show increased sediment and nutrient loading to Pigeon Creek and the Ohio River based on the loss of wetlands just within the Seven Hills Mine site footprint. Where Pigeon Creek joins the Ohio River, nutrient loads increase by over 3,500 pounds annually and sediment loads increase by over 260,000 pounds annually.

The EPA's concerns regarding impacts to water quality are further heightened by the State of Indiana's list of impaired waters, which identified biotic communities in Pigeon Creek as already being impacted by low dissolved oxygen and high nutrient levels.⁴ Furthermore, given the algal issues in the Ohio River in 2015, the EPA is concerned about possible effects in the Ohio River with respect to safe drinking water and recreation. We would like to continue working with you to identify effective measures to better ensure protection of water quality, consistent with the Guidelines. Additional discussion regarding water quality concerns is provided in the attachments.

40 CFR Part 230.91-98 Compensatory Mitigation

The EPA is concerned that, based on the past performance of compensatory mitigation efforts in nearby watersheds, proposed efforts to create or restore forested wetlands on recently mined land may not be successful in supplying the suite of important water quality, flood water attenuation and habitat functions that existing floodplain forested wetlands currently provide. For example, efforts to restore floodplain forested wetlands associated with the North Millersburg Mine failed because the finished topography on much of the reclaimed area was too high in elevation to function as floodplain forest. That area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The EPA recommends that the mitigation

² 40 CFR Part 230.10(b)

³ 40 CFR 230.10(c)

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMDL Development Schedules

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US ARMY CORP NEWBURGH REGULATORY

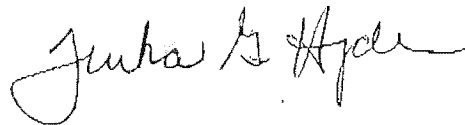
No. 0078 P. 5

plan be revised to ensure consistency with the requirements of the Federal Mitigation Rule. The plan should identify appropriate performance standards, monitoring and adaptive management to determine if the mitigated wetlands are developing into the desired resource type and providing the expected functions. The plan also needs to include financial assurances to guarantee the long term management and potential for corrective action of the mitigation sites. Attachment 3 includes detailed comments regarding mitigation.

In light of these concerns, the EPA believes that the project may have substantial and unacceptable impacts on aquatic resources of national importance pursuant to Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

Thank you for the opportunity to provide comments on this project. Please contact Wendy Melgin at (312) 886-7745 with any questions you may have or to schedule additional discussions.

Sincerely,



Tinka G. Hyde
Director, Water Division

Attachments

Overall Project Comments
Cumulative Impacts
Mitigation

Enclosures

March 17, 2016 USEPA and FWS letter
Millersburg II Mine Documents

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)
Scott Pruitt, US Fish and Wildlife Service (via email)
Martha-Clark Mettler, IDEM (via email)
David Carr, IDEM (via email)

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US ARMY CORP NEWBURGH REGULATORY

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Attachment 1
Overall Project Comments

Attachment 1 - Overall Project Comments

General Comments

Section 404 of the CWA requires applicants to provide enough detail in the application to determine compliance with the Section 404(b)(1) Guidelines (the Guidelines).¹ The amount of effort and detail in the analysis should be commensurate with the level of aquatic resources impacted. While United Minerals has revised its preliminary application from previous submittals, the project fails to comply with the Guidelines in that the applicant has not demonstrated the project is the least environmentally damaging practicable alternative (LEDPA). While EPA believes the proposed project is not the LEDPA and may cause significant degradation, the application also lacks sufficient information to make a reasonable judgement that the discharge will comply with the remainder of the Guidelines' requirements. For example, United Mineral does not account for secondary impacts or provide detailed mining plans. Additionally, the proposed project fails to include all appropriate and practicable measures to minimize harm to the aquatic environment as specified in this attachment. As such, the EPA requests that the Corps deny the permit. If the Corps does not intend to deny the permit, EPA continues to recommend that an environmental impact statement (EIS) be prepared. An EIS will allow the Corps to identify the full range of alternatives, environmental impacts and mitigation opportunities.

Floodplain forested wetlands are a transitional habitat between the river or stream and upland and serve as a wildlife corridor between habitats. Nutrients are exchanged in these wetlands, with floodwater depositing silt and nutrients and the upland contributing leaf litter and runoff. The fluctuating water levels and nutrient rich soils make these wetlands highly diverse and excellent habitat for aquatic and terrestrial wildlife. Furthermore, floodplain forested wetlands provide services that cannot easily be duplicated by man-made facilities. During heavy rainfall, these wetlands divert, store, and slow the flow of water to reduce flood damage downstream, filter nutrients (especially nitrogen and phosphorus) and sediments from water flowing through them, sequester carbon dioxide and act as a sink for carbon.

The loss of over 500 acres of wetlands performing the services listed above may have a detrimental effect on water quality and may cause or contribute to a violation of state water quality standards.² On Indiana's 303(d) list of impaired waters, Pigeon Creek is listed as impaired for *E. coli*, dissolved oxygen, impaired biotic communities and nutrients, and the Ohio River is listed as impaired for *E. coli*, dioxin, total mercury and PCBs.

Assessment of Impacts

Although United Minerals accounts for direct and cumulative impacts associated with the proposed project, secondary impacts are not addressed as required by the Guidelines.³ Additionally, United Mineral's proposed compensatory mitigation accounts for only direct impacts. Comments on Cumulative Impacts and Mitigation are addressed in separate attachments (Attachments 2 and 3).

¹ 40 CFR 230.12

² 40 CFR 230.10

³ 40 CFR 230.11

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Secondary Impacts

Secondary impacts on an aquatic ecosystem are associated with the discharge of dredged or fill material, but do not result from the actual placement of the dredged or fill material.⁴ EPA believes all the wetlands United Mineral labeled "avoided" along the west bank of Pigeon Creek as well as, the wetlands and streams which extend off site to the west of the project limits, will be subject to secondary impacts from this project. Within the project area alone, this includes over 200 acres of wetlands and over 13,000 linear feet of stream.

The floodplain forested wetlands to the west of Pigeon Creek are part of both palustrine and riverine systems; they receive hydrologic inputs from surface water, groundwater and flood events. Similarly, the streams on the project area receive the same hydrologic inputs as the wetlands through which they flow. The proposed mine pit will bisect the floodplain forested wetlands, severing the tributary streams to the west of Pigeon Creek from their headwaters and diverting flood waters to the east of Pigeon Creek. During mining operations, the mine pit will be dewatered and ground water levels will be drawn down and locally reduced. Roadways and conveyer systems within the project area may also cause secondary impacts. At a minimum, the secondary impact assessment should include a review of impacts to the following hydrologic sources:

Reduction of surface water sources

- Wetlands and streams within the buffer on the west bank of Pigeon Creek
- Wetlands bisected by roads/conveyor systems that connect Seven Hills to High Point

Reduction of flood sources

- Wetlands and streams within the buffer on west bank of Pigeon Creek

Reduction of ground water sources

- Wetlands and streams within the buffer on the west bank of Pigeon Creek
- Pigeon Creek baseflow
- Wetlands and streams that extend offsite to the west of the proposed project

United Minerals should also describe how the water within the mining pit will be handled during all phases of the operations.

Plans "Subject to Change"

It is difficult to accurately assess impacts to aquatic resources and provide meaningful comments when United Minerals has stated multiple times within the application that the impacts, and even the reason for impacts, may change. United Minerals states on page 1 the "disturbances may include, but are not limited to, surface mining, coal haulage and access roads, coal processing, storage and loadout facilities, mine management, maintenance and support facilities, and topsoil and subsoil piles." United Minerals further states that its Operations Map on page 1 is "the general operations plan and is subject to change." United Minerals states on page 3 of its application that the post-mining land uses are "subject to change due to property owner waivers and modifications to the mining plan but are current as of May 2015." Similarly, following the

⁴ 40 CFR 230.11(h)

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impacts table on page 19, United Minerals states "[t]he above impacts are based on the current operations map, which is subject to change as mining commences."

With both the impacts and the post-mining landscape "subject to change," EPA cannot make a reasonable judgement as to whether or not the proposed discharge will comply with the Guidelines and cannot determine if the proposed discharge includes all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem as required by the Guidelines.⁵

For example, there are two haul roads labeled on the operations map which extend to the east over Pigeon Creek and impact wetlands on the west side of Pigeon Creek. However, within Appendix A of the application there are crossing designs which indicate the northern crossing is proposed as a conveyor system and the southern crossing is identified as a bridge crossing; not two haul roads as indicated on the Operations Plan. Also, designs and engineered drawings are not provided for the remainder of the haul road or conveyor system as it extends east towards the proposed High Point Mine (LRL-2013-444-rjb). The construction and design of these features could include diversion ditches and culverts for the haul road or the conveyor as it extends through wetlands on the Seven Hills Mine onto the High Point Mine. The inclusion or exclusion of these features could change the amount of direct and secondary impacts from the construction of features through the middle of wetlands. Further, United Minerals has not discussed why all the haul roads and the conveyor system are necessary and why alternative designs or points of ingress or egress are not possible. United Minerals has not discussed why impacts to aquatic resources which allow direct access to the High Point Mine are needed, as the processing plant is planned on the Seven Hills mine. This further underscores the recommendation highlighted below and in the March 17, 2016 joint EPA/FWS letter (Enclosure 1) that the two mines be treated as a single project.

United Minerals does provide a general discussion on mining reclamation methods in the Midwest and general statements on the effects of mining, such as on soil infiltration, ground water recharge, and increased base flow. However, it is not clear in the Land Use section which reclamation methods would be used on site and if all of the effects of mining are anticipated. United Minerals needs to discuss the specific reclamation methods proposed and describe specific impacts to soil infiltration, ground water recharge, and increased base flow.

Independent Utility

As EPA and FWS highlighted in the March 17, 2016 joint letter, the Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine, which is also operated by United Minerals. United Minerals' Surface Coal Mining and Reclamation Act permit from Indiana Department of Natural Resources (IDNR) overlaps with the High Point Mine's boundary. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine are also described in the High Point Mine application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would have independent utility.

⁵ 40 CFR 230.12

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As discussed above, there are two haul roads which connect the Seven Hills Mine and the High Point Mine. Both mines have proposed utilizing separate coal processing plants. Had United Minerals submitted these mines together, the review of the project for compliance with the Guidelines could have considered additional ways to minimize impacts and even potential on-site mitigation opportunities through preservation, enhancement, and restoration.

Therefore, the EPA continues to request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosure 2).

Aquatic Resources of National Importance

EPA is concerned that the project's proposed CWA Section 404 discharges may result in unacceptable adverse impacts to the Ohio River, Pigeon Creek and its floodplain forested wetlands. EPA considers Pigeon Creek, its floodplain forested wetlands and the Ohio River all Aquatic Resources of National Importance (ARNI). The forested floodplain forested wetlands along Pigeon Creek are an important and productive habitat. In addition to the habitat value of natural areas, floodplain forested wetlands serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by attenuating and storing floodwater. These wetlands improve water quality by filtering nutrients, processing organic material, and reducing sediment loads before Pigeon Creek discharges into the Ohio River.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain IDNR wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles, bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the Wabash-Erie Canal and a portion of Pigeon Creek on-site is part of the former canal. Today, the Creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as "an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

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environment.”⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed protect the quality of the Ohio River from nonpoint source pollution caused by urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River flows 981 miles to Cairo, Illinois, where it discharges into the Mississippi River. The Ohio River flows through or borders six states: Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia. Nonpoint source pollution from urban runoff, agricultural activities, and abandoned mines is a major cause of water pollution in the Ohio River. By volume, the Ohio River is the largest contributor of flow to the Mississippi River. The river itself provides drinking water, hydroelectric energy, shipping routes to the Mississippi, recreation and fishing. Several fish consumption advisories currently exist for the Ohio River.⁸

Significant Degradation

The preamble to the Guidelines states that discharges may not be permitted if they will have a “significantly” adverse effect on various aquatic resources. In this context, “significant” and “significantly” mean more than “trivial.”

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such changes can result in major impairments of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.⁹ See Attachment 2 - Cumulative Impacts for a discussion. As stated above, United Minerals does not analyze or discuss secondary impacts within the permit application. This analysis and discussion needs to be added to the application.

During mining, sediment concentrations and load rates increase dramatically compared to the pre-mining condition.¹⁰ Total suspended solids and total dissolved solids are likely to increase. Increased erosion associated with mining can alter streamflow and transport sediment and pollutants, which adversely affect downstream aquatic ecosystems. Studies have found that more frequent, higher daily flow volumes occur during the active phases of mining compared to pre-mining conditions.¹¹ This is attributable to the loss of vegetative cover that normally reduces runoff volumes and promotes infiltration. As such, the proposed loss of nearly 500 acres of forested wetlands from this project will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of

⁷ <http://www.evansville.gov/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

⁹ 40 CFR 230.11(g)

¹⁰ Bonta, James V., 2000. “Impact Of Coal Surface Mining And Reclamation On Suspended Sediment In Three Ohio Watersheds.” *Journal of the American Water Resources Association (JAWRA)* 36(4): 869-887.

¹¹ Bonta, James V., C. R. Amerman, T. J. Harlukowicz, and W. A. Dick, 1997. Impact of Coal Surface Mining on Three Ohio Watersheds-Surface-Water Hydrology. *Journal of the American Water Resources Association (JAWRA)* 33(4): 907-917.

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water to the Ohio River. As stated above, both Pigeon Creek and the Ohio River are listed on Indiana's list of impaired waters for various pollutants. The Ohio River experienced algal problems in 2015, which raises concerns about the possible effects to safe drinking water, wildlife and recreation (see Enclosure 1).

In addition to localized impacts to water quality, the increase of nutrients, and specifically nitrogen, in the watershed has had a demonstrated effect on water quality. The United States Geologic Survey (USGS) published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The USGS identified the Highland-Pigeon Creek watershed as one of the watersheds that contributes more than 90% of its nitrogen to the Gulf.¹² EPA's initial Soil Water Assessment Tool (SWAT) modelling results, which do not include cumulative impacts of mining, indicate that the loss of the wetlands along Pigeon Creek would increase nutrient and sediment loads to the Ohio River by an annual amount of over 3,500 pounds and over 260,000 pounds respectively (see Enclosure 1).

Section 404(b)(1) Guidelines Analysis

EPA has serious concerns with the project as proposed due to the availability of less damaging practicable alternatives, the inadequacy of avoidance and minimization measures, failure to consider any secondary impacts, and an inadequate compensatory mitigation proposal. Detailed comments on cumulative impacts and the proposed mitigation are included in Attachment 2 – Cumulative Impacts and Attachment 3 – Mitigation respectively.

Least Environmentally Damaging Practicable Alternative

In accordance with 40 CFR 230.10(a) "...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the impact does not have other adverse environmental consequences." Based on the information provided by United Minerals, the applicant has not demonstrated that this site is the LEDPA. Identification of the LEDPA is achieved by performing an alternatives analysis that estimates the direct, secondary, and cumulative impacts to jurisdictional waters resulting from each alternative considered.

United Minerals estimates in the application that the Seven Hills Mine has ~12 million recoverable tons of coal valued at \$480 million. The discussion on page 35 of United Minerals' application highlights that 17 billion tons of recoverable coal remain in Indiana and 130 billion tons occur within the Illinois Coal Basin, which includes Indiana coal. United Minerals then states that the Indiana reserves would maintain the State of Indiana's current extraction rate for 500 years and separately the entire Illinois Coal Basin could meet the United States coal demands for over 100 years based on current extraction rates. With such large reserves remaining in Indiana alone, it is reasonable to consider that less damaging alternatives exist within the basic project purpose to mine coal in Indiana, although United Minerals' broader stated purpose which is to "produce bituminous coal by surface mining methods to contribute to power production for the United States." As the Guidelines provide a rebuttable presumption that less damaging practicable alternatives exist, United Minerals should provide a comparative

¹² Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

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evaluation of the environmental impacts associated with additional alternatives within the same coal basin that would meet the basic project purpose and entail recovery from other coal reserves and holdings that it owns or that could reasonably be obtained through a parent company or other contractual relationships.

Avoidance and Minimization

Avoidance and minimization of impacts are evaluated during the sequencing required by the Guidelines.¹³ In order to comply with the Guidelines, the applicant must demonstrate that all practicable steps have been taken to avoid and minimize unavoidable impacts to the maximum extent possible and finally, to compensate for any unavoidable losses.

As stated above, the general nature of the operations plan and United Minerals' uncertainty of impacts impedes the review of the proposed project and precludes meaningful comments on minimization efforts. While United Minerals incorporated a physical buffer to Pigeon Creek as a minimization measure, it did not analyze or address the secondary impacts that would occur to those waters in the "buffer" along Pigeon Creek. Likewise, the application does not contain any specific designs of attendant features. Nor does the application contain a discussion on why haul road and conveyor belt access is needed between the two mines and why those features had to be placed through wetlands and not configured differently to avoid or reduce impacts to aquatic resources. Further, United Mineral did not describe or discuss how water pumped from the pit would be handled and discharged. If a direct discharge from the pit to a water of the US is proposed, a Clean Water Act section 402 National Pollution Discharge Elimination System permit would be required. EPA is not aware of any applications submitted to the Indiana Department of Environmental Quality by United Minerals for this project to date.

Environmental Justice Analysis

EPA's comments are pursuant to Executive Order (E.O.) 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) and E.O. 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*). The applicant's determination that there are no disproportionately high and adverse impacts to communities with EJ concerns is premature, given the inadequacy of the data, analysis, and conclusions presented by United Minerals.

Inadequate data

For EJ analyses, EPA recommends the use of Census tract-level data when available and where appropriate, as opposed to county-level data. Census tract-level data is readily available from the U.S. Census Bureau American Community Survey (ACS) 2008-2012 five-year summary data. Typically, use of coarser data (such as county level) can mask pockets or artificially dilute presence of vulnerable populations that could potentially be impacted by the project. Using EJSCREEN,¹⁴ EPA determined that potential disproportionate impacts to vulnerable populations near the project area may occur as a result of the proposed project (see discussion below regarding impacts to children under the age of five). If the applicant continues to rely on county-level data for the appropriate geographic unit of analysis, EPA recommends it provide a rationale

¹³ 40 CFR 230.10(d)

¹⁴ EPA's publicly-available EJ analysis tool (<https://www.epa.gov/ejscreen>)

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defending this decision in its permit application or future modifications to the current application.

In addition to providing demographic data at the Census tract level, EPA also recommends the applicant include both maps and tables with raw data, in addition to percentages for the Census tracts that may be directly or indirectly impacted as a result of the proposed project. Maps, particularly at the Census-tract level, help demonstrate a spatial relationship between potential impacts and affected communities.

EPA notes that the unassigned table on page 54 includes percentages of "*white alone, not Hispanic or Latino*," but does not include a breakdown of data on minorities in the area. EPA recommends including data pertaining to minority populations in the project area, including raw numbers and percentages.

Analysis and Premature Conclusions

Per E.O. 13045, analysis and disclosure of potential effects to young children is necessary because some physiological and behavioral traits of children render them more susceptible and vulnerable than adults to environmental health and safety risks. Children may be more highly exposed to contaminants because they generally eat more food, drink more water, and have higher inhalation rates relative to their size. They may be more vulnerable to the toxic effects of contaminants because their bodies and systems are not fully developed and their growing organs are more easily harmed. The applicant has already identified that Warrick County, Indiana, exceeds the state and national percentages for persons under the age of 18, and its analysis assumed that this was because higher populations of children live in larger populations centers, some four miles away from the proposed site. However, EJSCREEN reveals a high number of children under the age of 5 in one of the Census tracts within the project area. Therefore, the analysis should include information on potentially adverse impacts to children as a result of the proposed project.

The project area is in attainment for all six commonly found air pollutants (also known as "criteria pollutants"). However, EJSCREEN reveals elevated levels of annual fine particulate matter (PM_{2.5}). EPA is concerned that continued release of air pollutants as a result of the proposed project, including PM_{2.5}, will potentially cause adverse impacts to vulnerable populations, such as children under the age of five (see above documentation that vulnerable populations exist in project area). According to EPA's *America's Children and the Environment*¹⁵ report, exposure to particulate matter aggravates respiratory and cardiac functions. In children, this translates to decreased lung function growth, exacerbation of allergic symptoms, and increased respiratory problems. EPA recommends the applicant provide an analysis that addresses potentially continued or increased impacts as a result of the proposed project to children under the age of five.

Based on the inadequacy of the alternatives analysis discussed above, EPA is unable to determine whether other alternatives have less impact on communities living with BJ concerns. We believe United Minerals' determination that there are no disproportionately high and adverse

¹⁵ <https://www.epa.gov/ace>

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impacts as a result of the proposed project is premature and not supported by the provided data and analysis.

CWA Section 404 Corps' Public Interest Review

Within the Section 404 permit review, the Corps must take an applicant's purpose and need into account during their public interest review.¹⁶ The applicant's stated purpose and need is an expression of the underlying goals for the proposed project.

EPA is concerned that United Minerals has not provided information to demonstrate project need, which should consider the current demand, market conditions, and currently available coal from other sources. The application states that mining will be based on market conditions, but does not substantiate that there is a market demand as discussed in the application on demand, usage and production are based on various data from 2009 through 2011.

Indiana coal production is down 7.2% over the previous year.¹⁷ This drop in production can be attributed to a decrease in coal demand domestically as well as globally. U.S. coal consumption decreased 11% between January and July of 2015, with coal electricity generation falling to 36% of total generation, down from 50% ten years ago.¹⁸ Reuters reported in November 2015 that in September 2015, natural gas surpassed coal as the leading power source in the U.S.¹⁹ Overseas, China's imports have fallen by 31% and use has declined by 5% between January and August 2015.² Lenders have also recognized the decline in coal. Major banks, such as Wells Fargo, Morgan Stanley, Bank of America, and Citigroup have all vowed to cut financing to coal mining projects due to both their adverse effects on the global climate as well as low expectations for a rise in future coal mine demands.²⁰

The coal reserves in the proposed mine are owned by Peabody and Alcoa. The application should analyze both companies' current demand, the coal tonnage at current stockpiles, and the coal reserves at operating mines. EPA notes that there are other coal companies in southern Indiana that are managing excess coal from currently operating mines. For example, on November 3, 2015, it was reported that nearby Duke Energy in Indiana was attempting to reduce its current stockpiles through deferment of contracts and resale.²¹

In light of these factors, the applicant needs to clearly demonstrate the need for the project.

¹⁶ 33 CFR 320.4 (a)(2)(i)

¹⁷ <http://coalvalleynews.com/news/business/1151/u-s-coal-production-continues-to-trend-below-2014>

¹⁸ http://www.huffingtonpost.com/entry/coal-consumption-decrease-greenpeace-study_5640b6c7e4b0411d3071a07d

¹⁹ <http://www.reuters.com/article/2015/12/01/us-usa-natgas-coal-idUSKBN0TK52K20151201#QsvZvstB2ZtGibCR.97>

²⁰ <http://money.cnn.com/2015/12/01/investing/paris-climate-talks-wall-street-banks-coal/>

²¹ <http://www.platts.com/latest-news/electric-power/louisville-kentucky/duke-energy-indiana-defers-coal-deliveries-as-21405101?hottopostid=a0ccf05c4cf633c79f1febdd0359e39b>

Attachment 1 - Overall Project Comments

Specific Comments

Below are comments on specific statements made by United Minerals in its application:

Land Use - Page 3

The following post-mine land uses are subject to change due to property owner waivers and modification to the mining plan but are current as of May 2015.

As discussed above, the lack of certainty on the post mining landscape and potential modifications to the mining plan make it difficult to accurately assess direct, secondary and cumulative impacts. Based on the proposed changes in the location of the aquatic resources in the post-mine landscape shown on the Mitigation Map, United Minerals does not propose to reestablish the connections between the offsite wetlands and the proposed forested wetlands. This segregation of resources offsite should be accounted for when assessing secondary impacts.

Land Use - Page 4

Coal mining in the Midwest utilizes water control structures such as terraces which in turn slows the runoff velocity. This significantly reduces erosion and transport of suspended solids as compared to typical runoff in areas with an agricultural land use. Site reclamation produces topographic relief consistent with the local area and incorporates many erosion control methods such as terracing and dry-dam structures to control runoff velocity.

While United Minerals characterizes some mining reclamation practices in the Midwest, it does not discuss which reclamation and erosion control practices would be applied on site nor where those practices would be applied. For example, United Minerals discussed water control structures that include terraces and dry dams; however, given the project's location in the floodplain of Pigeon Creek, is not clear if these techniques would be used or where they would be located. The application and location of these practices could affect the amount of secondary impacts and impacts to downstream water quality.

Groundwater - Page 24

There are no known residential groundwater wells or wellhead protection zones that exist in or within 1,000 feet of the permit area. The so called residential water wells in the area are wells in name only, in that the originally manually dug cavities that were constructed as water wells, have out of necessity been converted to cisterns, or simple underground storage vessels. These vessels are regularly refilled with water obtained from the local public utility and hauled to each specific site by tanker trucks.

EPA is concerned about the water wells that may be affected despite United Minerals' reference to "so called drinking water wells." Based on United Minerals' narrative, it is not clear how many of these wells would be impacted and what their purpose is (i.e. drinking water, agriculture, and industrial). These features should be quantified and assessed for impact under the Corps' Public Interest Review.

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Groundwater -- Page 51

Mining and mine reclamation result in increased soil infiltration... Mined soils function as a groundwater storage system that slowly release infiltrated water resulting in diminished flooding downstream... In lower elevations, actual base flows could be sustained or elongated depending on the permeability of the spoil.

EPA believes that if an increase in baseflow occurs post mining, an increase in TDS and other minerals will also occur due to the infiltration of water through mine spoils. Given the proximity to downstream waters, EPA does not agree that impacts will be isolated to the immediate mined area as United Minerals asserts on page 4. This secondary effect on groundwater chemistry and change in base flows should be quantified and mitigated.

Attachment 2

Cumulative Impacts

Attachment 2 – Cumulative Impacts

Cumulative Impacts – Overall Comments

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines,¹ the applicant should prepare a cumulative impacts analysis that details the changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct, cumulative and secondary impacts from previous and current actions, as well as impacts to surface and ground water hydrology from future actions. As indicated in Attachment 1, General Comments, United Minerals does account for cumulative impacts associated with the proposed project, but secondary impacts are not addressed in the revised application as required by the Guidelines.²

Cumulative impacts are required as part of the factual determinations required under the Guidelines.³ Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.⁴ In the revised application, United Minerals provides an assessment of the Clear Branch-Pigeon Creek Watershed (i.e. 12-digit Hydrologic Unit Code (HUC) watershed scale). However, EPA believes the scope of United Minerals cumulative impact assessment needs to be revised because the assessment is focused on the smaller watershed and not the entire Highland-Pigeon Creek watershed.

Scope of Cumulative Impacts Assessment

As mentioned in Attachment 1, General Comments, EPA used the Soil and Water Assessment Tool (SWAT) model, to assess the 8-digit HUC Highland-Pigeon Creek watershed. The initial modelling results indicated that project impacts would have a measurable effect on both Pigeon Creek and the Ohio River. This was a conservative estimate because modelling did not include data from the Indiana Department of Natural Resources (IDNR) indicating that past mining impacted 26.4% of the Indiana portion of the Highland-Pigeon Creek watershed. Including these additional impacts into the model would have increased the effect of cumulative impacts on downstream water quality. Table 1 and Figure 1 illustrate the locations of past mining.

¹ 40 CFR 230.11(g)

² 40 CFR 230.11(h)

³ 40 CFR 230.11 (g)

⁴ 40 CFR 230.11(g)

Attachment 2 - Cumulative Impacts

potential for hundreds of additional acres of wetland impacts from future mining in the Clear Branch-Pigeon Creek Watershed alone.

United Minerals' cumulative surface effects summary within the Clear Branch-Pigeon Creek Watershed on page 39 of the application:

12-Digit Cumulative Surface Effects Summary							
Watershed	Watershed Area	Previously Affected by Mining	Watershed Previously Affected by Mining	Currently Affected by Mining	Watershed Currently Affected by Mining	Potentially Affected by Mining	Watershed Potentially Affected by Mining
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
Clear Branch-Pigeon Creek	22,960	10,940	47.7	155	0.7	4,062.5	15.2

United Minerals' estimate of impacts within the Clear Branch-Pigeon Creek Watershed on page 40 of the application:

Estimated Stream and Wetland Impacts from Past Mining			
Watershed	Previously Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	10,940	153,160	2,286.5

United Minerals' estimate of future impacts within the Clear Branch-Pigeon Creek Watershed on page 40 of the application:

Estimated Stream and Wetland Impacts from Potential Mining			
Watershed	Potentially Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	4,062.5	153,160	700

The tables above, provided by the applicant, demonstrate that, even without considering the cumulative or secondary impacts within the context of the larger Highland-Pigeon Creek watershed, the loss of streams and wetlands tributary to Pigeon Creek has been substantial. Therefore, the continued loss of these resources, as a result of the proposed project, may cause or contribute to the significant degradation of Pigeon Creek. The preamble to the Guidelines states that discharges may not be permitted if they will have "significantly" adverse effects on various aquatic resources. In this context, "significant" and "significantly" mean more than "trivial."

Characterization of the Timing of Coal Mining Impacts

In the application, United Minerals stated that coal mining activity in Warrick County dated back to the 19th century. However, a review of historic United States Geologic Survey (USGS) Maps indicates that surface coal mining within the Highland-Pigeon Creek watershed occurred primarily after 1963. The three maps below show previous surface mining in the Highland-Pigeon Creek watershed, existing surface mining, the location of the proposed Seven Hills and High Point Mines, and the location of impaired reaches on Pigeon Creek.

Attachment 2 – Cumulative Impacts

Figure 2

Locations of Surface Mining in the Highland-Pigeon Creek Watershed (1960-1967)

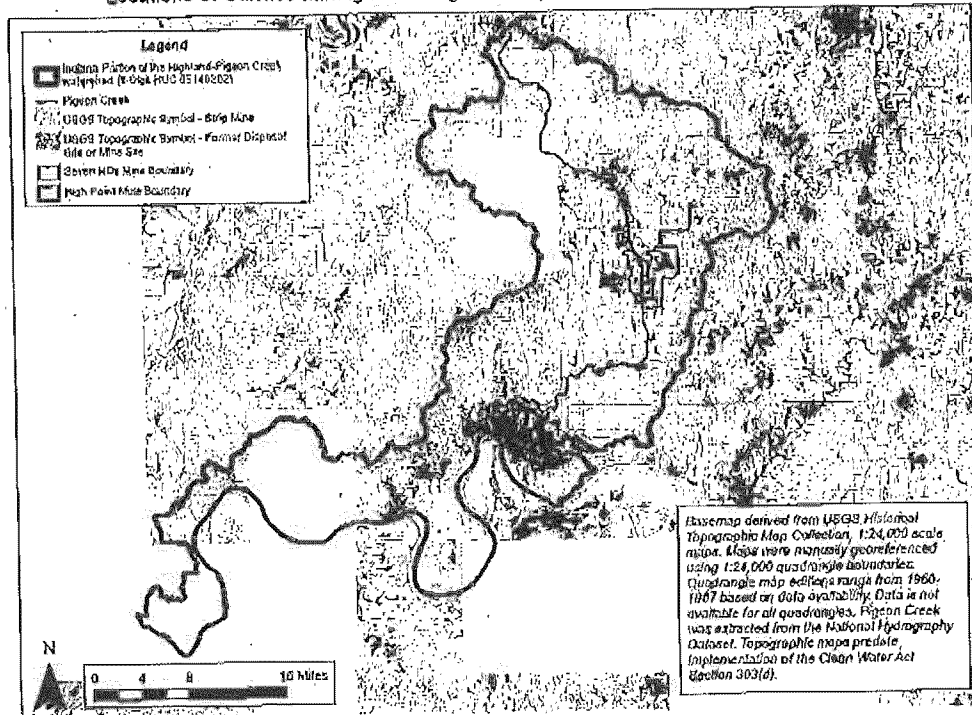
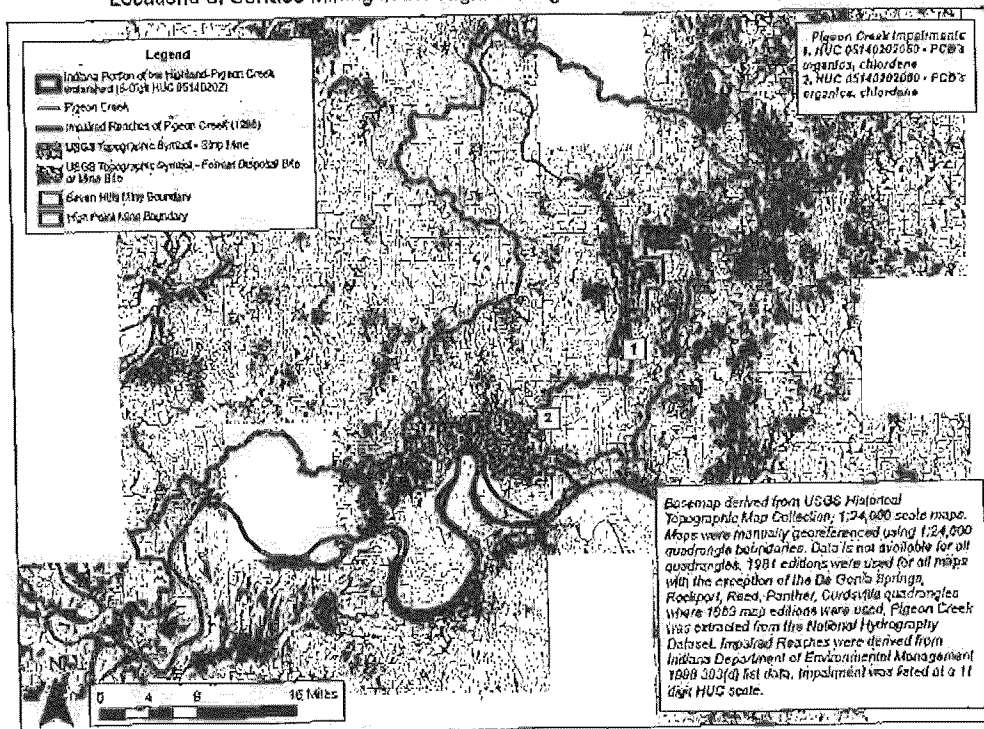


Figure 3

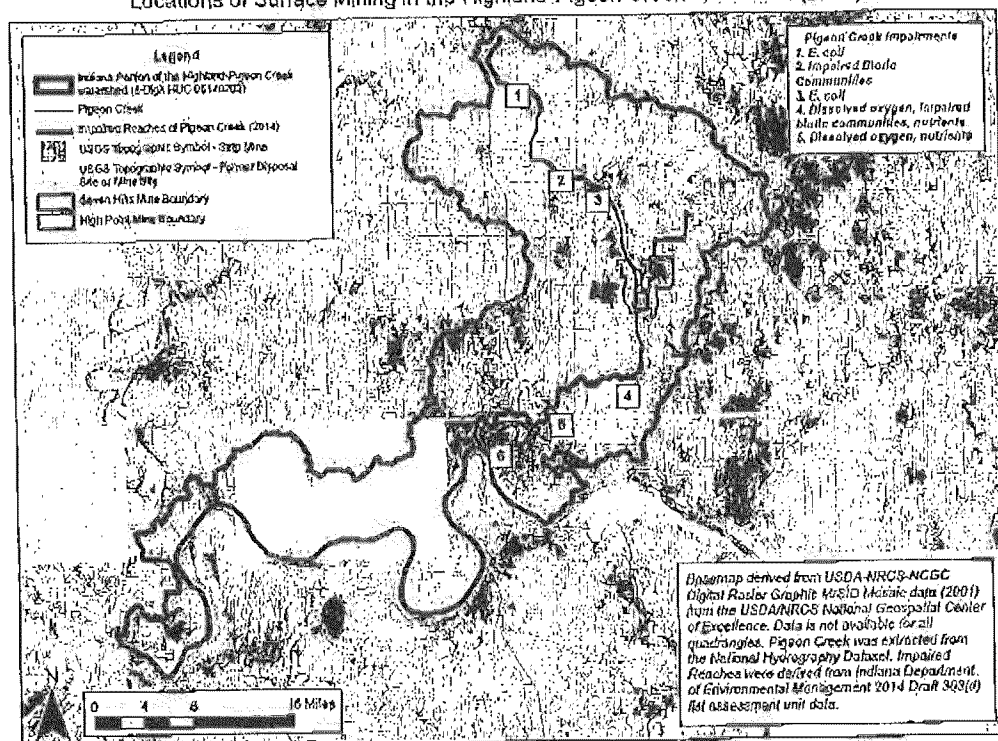
Locations of Surface Mining in the Highland-Pigeon Creek Watershed (1981-1983)



Attachment 2 – Cumulative Impacts

Figure 4

Locations of Surface Mining In the Highland-Pigeon Creek Watershed (2001)



The increase in mining operations in the watershed from the 1960's to present day contributed to the impairment of Pigeon Creek downstream of mining activities. It is important to note that the reach of Pigeon Creek bordered by floodplain forested wetlands is considered unimpaired, as shown on IDEM's online 303(d) Tool.⁵ However, IDEM is currently considering listing that portion of Pigeon Creek downstream of the proposed project for total dissolved solids, *E. coli*, nutrients, and dissolved oxygen. The changes in impairments downstream of mining activity supports EPA's position that the proposed mine may significantly affect Pigeon Creek.

Intensity of Contemporary Impacts

Table 2 shows direct mining impacts over the past 8 years in the larger Highland-Pigeon Creek watershed. EPA found that direct impacts to 352.67 acres of wetlands and 527,689 linear feet of streams were authorized by the Corps through CWA Section 404 Individual permits for surface coal mining operations. The most recent impacts were authorized by the Corps in February of 2016. While EPA does not believe the cumulative impacts analysis should be limited to the past 8 years, we note that 24.9% of the 56,299 acres of land affected by surface coal has been permitted within that time frame.

⁵ <http://www.in.gov/idem/nps/pages/e303d/index.html>

Attachment 2 – Cumulative Impacts

Table 2 Direct Mining Impacts in Highland-Pigeon Creek Watershed

Mine	Corps Project #	Mine area (ac)	Total Wetlands (ac)	Total Stream (lf)
Liberty	LRL-2010-218-gjd	1,646	105.8	20,343
Liberty Amendment	LRL-2014-336-gjd	136	34	5,035
Wild Boar	LRL-2008-228-gjd	8,853	145.33	346,309
Somerville South Amendment 2	LRL-2010-00953-r9r	946	27.87	37,365
Somerville South Amendment 3	LRL-2013-0423-sew	1,746	33.07	84,353
West 61 North Amendment	LRL-2007-1330-A-gjd	233	6.5	11,889
Cardinal Mine	LRL-2009-937-rjb	439	0.1	22,395
Total		13,999	353.07	527,689

The two Liberty Mines are located to the south and east of the proposed Seven Hills Mine. The Liberty mine permits, shown in Table 2, authorized impacts to 139.8 acres of wetland and 25,378 linear feet of stream. Table 3 highlights the additional wetland and stream impacts which may result from the proposed High Point Mine and Seven Hills Mine. These three adjacent mines would cumulatively impact over 135,000 linear feet of streams and nearly 700 acres of wetlands, with the vast majority of impacts occurring within the Clear Branch-Pigeon Creek watershed. The combined footprint of the three mines would cover 18,762.6 acres, or 28.5% of the Clear Branch-Pigeon Creek subwatershed and 7.9% of the larger Highland-Pigeon Creek watershed.

Table 3 Direct Impacts Proposed for Seven Hills Mine and High Point Mine

Mine	Mine area (ac)	Total Wetland Impacts (ac)	Total Stream Impacts (lf)
Seven Hills	1,678.6	510.16	53,840
High Point	3,085	45.7	59,347
Total	4,763.6	555.86	113,187

While there have been large impacts in the watershed during the past 8 years, the total wetland impact for Seven Hills is more than all the recently permitted coal mines combined in the Highland-Pigeon Creek watershed. This would be the single largest wetland complex proposed for impact in the southern Illinois Basin within the last eight years. EPA believes that the Seven Hills Mine may cause or contribute to the significant degradation already expressed in both the Clear Branch-Pigeon Creek and Highland-Pigeon Creek watersheds, and that those impacts may have a detrimental effect on the water quality of Pigeon Creek and downstream waters.

May. 2. 2016 2:58PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 25

Attachment 3

Mitigation

Attachment 3 -- Mitigation

Compensatory Mitigation Plan

United Minerals proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 27.13 acres palustrine emergent, 19.81 acres of palustrine scrub-shrub, and 1.04 acres of palustrine unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial streams using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a Clean Water Act (CWA) Section 404 permit review.¹ An in-depth discussion regarding mitigation is premature without a demonstrated need for the project and subsequent determination of measures to avoid and minimize impacts to streams and wetlands. However, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following comments at this time.

United Minerals' compensatory mitigation plan (the plan) does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, the analysis needs to factor in the impacts from these mines when planning mitigation.

The plan does not address all components of a compensatory mitigation work plan as required under the 404(b)(1) Guidelines (Guidelines).² Of the twelve required components of a compensatory mitigation plan, the plan fails to provide the following:

- The manner in which the resource functions of the compensatory mitigation address the needs of the watershed and ecoregion;³
- A description of factors considered when selecting the off-site mitigation site; specifically the practicability of accomplishing self-sustaining aquatic resource restoration and enhancement;⁴
- An adequate description of site protection instruments for the proposed compensatory mitigation sites;⁵
- An adequate rationale for the determination of credit ratios;⁶
- An adequately detailed mitigation work plan which details construction methods, timing and sequence, sources of water including connections to existing waters and uplands, plans to control invasive species, water management plan and a grading plan;⁷
- An long-term management plan;⁸
- An adequate adaptive management plan;⁹ and
- Appropriate financial assurances.¹⁰

¹ 40 CFR 230.91(c)

² 40 CFR 230.94(c)

³ 40 CFR 230.94(c)(2)

⁴ 40 CFR 230.94(c)(3)

⁵ 40 CFR 230.94(c)(4)

⁶ 40 CFR 230.94(c)(6)

⁷ 40 CFR 230.94(c)(7)

⁸ 40 CFR 230.94(c)(11)

⁹ 40 CFR 230.94(c)(12)

¹⁰ 40 CFR 230.94(c)(13)

Attachment 3 – Mitigation

Credit ratios determination

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time of impact and mitigation, the length of time needed for the maturation for forested wetlands, and the risk of failure in establishing forested wetlands. According to national wetland status and trend reports published by U.S. Fish and Wildlife Service, forested wetlands have experienced the greatest decline of all wetland types. More importantly, forested wetlands are extremely difficult to restore/create and take up to 20 years to become fully functional.

EPA recommends that the applicant be required to mitigate for forested floodplain wetlands at a ratio of 4:1. This is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.¹¹ For mitigation to be considered successful, performance standards in the plan would have to be achieved. It is our understanding that neither stream nor wetland hydrology will be re-established until well after the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (as opposed to the mitigation proposed at the "avoided" areas).

Further, the Guidelines indicate that when a functional or condition assessment is not used to determine compensatory mitigation, a minimum 1:1 ratio compensation ratio must be used.¹² As such, the proposed ratio of 0.5:1 for palustrine emergent wetland and palustrine unconsolidated bottomland is not adequate. A rationale for the allocation of ratio's at less than 1:1 is a required component of a compensatory mitigation plan.¹³

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and that success in generating functional lift is often elusive. The U.S. Fish and Wildlife Service asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland and floodplain forested wetlands associated with the North Millersburg Mine. In that case, the finished topography on much of the reclaimed area was too high in elevation to function as floodplain forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments are more comparable to rolling hills than floodplains. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Federal Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally

¹¹ 40 C.F.R. 230.93(f)(2)

¹² 40 C.F.R. 230.93(f)(1)

¹³ 40 C.F.R. 230.94(c)(6)

Attachment 3 – Mitigation

done by applying ratios to required compensation so that the amount of compensation will be adequate to offset the authorized impacts, even if the mitigation actions are not 100% successful.

On-site mitigation

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the mine footprint, in addition to the avoided areas to the east of Pigeon Creek. The plan discusses how restoration of wetlands in the avoided area will establish the hydrologic connection between streams and wetlands during periods of overbank flooding. However, it is unclear how this connection will function with the presence of a levee that runs along the east edge of Pigeon Creek, directly west of the other avoidance area on the east side of Pigeon Creek. The floodway modification plan for the area east of Pigeon Creek is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for wetland nutrient cycling and vegetation support for forested wetlands based on the study referenced in the application. Additional clarification is needed on the estimation that the contributing cumulative watershed is 2,500 acres. Overall, the plan does not detail how the proposed stream and wetland mitigation will connect with and benefit aquatic resources adjacent to the permit boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results in re-built streams using soil and material from recently mined areas. It is likely that intermittent and ephemeral streams would not have adequate flow, which will impact existing uses and downstream flow.

Overall, there is a lack of detail on reclamation processes and timelines as these relate to what we understand is a sequentially continuous mining approach. In the application, United Minerals provides a general discussion on mining reclamation methods in the Midwest, and general statements on the effects of mining on soil infiltration, ground water recharge, and increased base flow. However, in the Land Use Section it is not clear which reclamation methods would be used on-site and if all of the effects of mining have been anticipated. The application indicates that mining and reclamation will occur simultaneously as pits are backfilled and re-soiled as the next cut is made; re-soiled areas will then be revegetated, and returned to the approved post-mining land uses.¹⁴ The impacts are proposed to occur over a period of 7 to 8 years; however, the timing and rate of mining will be dependent on market demand fluctuations and geologic conditions.¹⁵ The uncertainty in the timing and rate of mining, and the fact that the Plan and Map will be further subject to change due to property owner waivers and modifications to the mining plan,¹⁶ makes it difficult to determine the direct, secondary and cumulative impacts of the project and adequate compensatory mitigation. United Minerals needs to discuss the specific reclamation methods to be used, and describe specific impacts to soil infiltration, ground water recharge, and increased base flow, as these are critical factors in gauging the success of the proposed on-site compensatory mitigation.

¹⁴ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, A. Project Summary, Page 1.

¹⁵ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, A. Project Summary, Page 1.

¹⁶ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, 3. Land Use and Soils, a. Land Use, Page 3.

Attachment 3 – Mitigation

The Mitigation Map details the anticipated post mining reclaimed landscape. Four of the six proposed sediment ponds will be retained as open water mitigation.¹⁷ While sediment ponds were placed and configured to control sedimentation and surface runoff from the area during mining, we do not believe that they will replace the lost functions of floodplain forested wetlands in the post mining landscape. The application states “Generally as a result of federal and state regulatory reclamation requirements, reclaimed sites include mitigated wetlands and streams having increased species and habitat diversity thereby enhancing the ecological function of the area. The post-mine land use of open water will approximate the pre-mine acreage. The additional range of aquatic habitat types as a result of reclamation will be an improvement over existing conditions.”¹⁸ Notwithstanding the applicant’s statement that its mitigation will be an improvement over the existing resources, EPA does not believe this to be the case. Floodplain forests are a transitional habitat between the river or stream and upland and serve as a wildlife corridor between habitats. Nutrients are exchanged in these wetlands, with floodwater depositing silt and nutrients and the upland contributing leaf litter and runoff. The fluctuating water levels and nutrient rich soils make these wetlands highly diverse and excellent habitat for aquatic and terrestrial wildlife. Furthermore, floodplain forested wetlands provide services that cannot easily be duplicated by man-made facilities. During heavy rainfall, these wetlands divert, store, and slow the flow of water to reduce flood damage downstream. Converting wetlands to open water ponds in the post mining landscape leads to a loss of wetland habitat and function and the Guidelines require such loss to be mitigated appropriately.¹⁹

EPA recommends United Minerals explore mitigation options that do not include open water ponds. For example, considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

Off-site mitigation

In addition to the on-site reclamation, United Minerals proposes off-site mitigation on Greathouse Island, an abandoned 608 acre oxbow of the Wabash River, in Posey County, Indiana. The proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 266.3 acres of existing forested wetland. United Minerals proposes to generate 450.1 mitigation credits from this work. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact. While it may provide some benefits to the Ohio River downstream, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. The instability of the proposed site is of concern, as this a remnant meander of the Wabash. The river and its floodplain are part of a dynamic system, largely controlled by upstream perturbations that may work to reactivate former channels and influence channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity. Further, while the objectives of the project are to provide flood, sediment, and nutrient storage to the Wabash River, the applicant did not quantify the level of functional lift to be provided

¹⁷ Appendix A, Map C

¹⁸ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, 3. Land Use and Soils, a. Land Use, Page 4.

¹⁹ 40 CFR § 230.93

Attachment 3 – Mitigation

compared to existing conditions. The mitigation plan needs to describe the resources and the functions that exist currently at the site, the ecological lift to the watershed resulting from the mitigation and the long term likelihood of success.

EPA does not support the use of Greathouse Island as off-site mitigation for the proposed mining impacts in the Pigeon-Creek watershed. The proposed mitigation site consists of former agricultural fields with forested wetlands bordering the former meander and portions of the river. The proposed mitigation would be considered vegetative enhancement rather than restoration. The enhancement activities may not prove successful in a system where the applicant indicates "Hydrology is currently sufficient and periodically excessive. Head and backwater flooding, ponding, and high water tables may delay certain activities while simultaneously promote vigorous establishment of target species."²⁰ The enhancement activities proposed do not merit the amount of credit proposed based on the site conditions, and would not compensate for the resources lost due to the project.

Mitigation for Cumulative and Secondary Impacts

United Minerals has failed to account for both cumulative and secondary impacts in its mitigation plan. As discussed in the Cumulative Impacts comments (Attachment 2), multiple mining operations exist at both the 8- and 12-digit HUC watershed. As discussed in the Overall Project Comments (Attachment 1), the wetlands and streams that extend off-site to the west of the project limits and the wetlands labeled as "avoided" along the west bank of Pigeon Creek, may be secondarily affected by this project due to the reduction of surface, flood, and groundwater sources during mining operations. Further, due to the increase in base flow anticipated from increased soil infiltration through mine spoils, there may be secondary effects on groundwater mineralization.

United Minerals indicates that temporal loss will be addressed through the restoration and enhancement activities proposed at the Greathouse Island site. EPA does not consider this to be an appropriate mitigation site for reasons stated above. Further, the application states that completion of the off-site wetland mitigation at Greathouse Island will likely occur by the end of the second growing season following permit issuance and "will occur long before the vast majority of impacts occur at the Seven Hills Mine site."²¹ Considering the life of the mine is 6 to 7 years, approximately 1/3 of the mining impacts will likely be completed before the construction at Greathouse Island is completed. It is unclear if the proposed timetable includes the typical 10 year monitoring required for forested wetland restoration or additional monitoring if the 10 year performance standards are not met (i.e. deemed unsuccessful by the Corps). This timetable may be further extended given the potential adaptive management measures that may be required due to the instability at this site.

Furthermore, recreating streams in a post mining landscape and creating forested wetlands from bare root seedlings is difficult, and delays and obstacles should be expected. Temporal losses take into account activities that will require time for vegetation and hydrology establishment,

²⁰ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative, Section 7: Off-Site Wetland Mitigation Plan, Page 80.

²¹ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative, Section 7: Off-Site Wetland Mitigation Plan, Page 80.

Attachment 3 – Mitigation

stream channel construction, and adaptive management and monitoring. EPA recommends that adequate mitigation for temporal losses be proposed by the applicant.

Other Corps Districts within EPA Region 5 have created and utilized a series of factors and value components to determine compensatory mitigation for temporal loss for both streams and wetlands. The components considered include the length of time between impact and completion of mitigation, the period between mitigation completion and maturity, the extent of long term protection measures in addition to restoration type and buffer work incentives. Based on this work, EPA recommends additional mitigation of 30% of the total impacts to compensate for the temporal loss of streams and wetlands on the site.

EPA recommends United Minerals conduct a thorough hydrologic assessment, including surface water and groundwater modeling and monitoring well installation to determine the extent of cumulative and secondary impacts as a result of the mining operation. EPA recommends compensatory mitigation be required for cumulative and secondary impacts. This additional mitigation could include direct restoration of additional resources off-site, preservation of high quality resources on-site, and special permit conditions requiring additional active or post-reclamation monitoring or study. If monitoring indicates adjacent streams and wetlands are drained or otherwise negatively impacted by the proposed mining activity, compensatory mitigation should be required to offset the reduction of surface and ground water sources contributing the hydrology of the adjacent systems.

Monitoring and Long-term Management

The proposed monitoring plan included with the application is insufficient because it lacks monitoring of specific parameters. The monitoring program for this project must require biological, chemical, and physical assessments throughout mining operations, including: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during mining operations to determine potential impacts to aquatic habitat and downstream water quality; and 3) after the completion of stream and/or wetland restoration and site reclamation activities for a minimum of five years to determine mitigation success. In the current application, the applicant has not proposed monitoring during mining. As part of the monitoring program for impacted and reconstructed streams, biological monitoring should be required, where applicable, to ensure there is no degradation to the communities that inhabit the aquatic resources.

The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

The applicant needs to provide financial assurances for CWA Section 404 mitigation and a long-term management plan. The Guidelines state that "financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments."²² The inherent risk in re-creating streams and wetlands on-site in the post mining landscape, necessitate the security of appropriate financial assurances.

²² 40 CFR 230.93(n)(2)

Attachment 3 – Mitigation

An adaptive management plan is provided, however, it does not include approaches or corrective actions to resolve problems that may arise, such as insufficient hydrology for stream restoration, invasive species proliferation or low survival of bare root seedlings.

To comply with the Federal Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs, annual cost estimates for these needs, and the funding mechanism used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

The current application indicates that deed restrictions will be initiated prior to and in conjunction with the Corps approval to cease monitoring; however, specific language under the applicant's long term management discussion indicates there may be portions of the compensatory mitigation where deed restrictions may not be placed. The Guidelines require protection of the entire property in perpetuity.²³ Failure to establish appropriate site protection instruments compromises the long-term sustainability of the resource.

²³ 40 CFR 230.94(c)(4) & 230.97(a)

May. 2. 2016 3:01PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 33

Enclosure 1

March 17, 2016 USEPA and FWS letter

May. 2. 2016 3:01PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 34



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-0059

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and

may impact downstream receiving waters, such as the Ohio River. The effects of multiple large scale surface mining operations and agricultural activities have increasingly taken a toll on the Pigeon Creek watershed. Project area aquatic resources, such as contiguous tracts of increasingly rare bottomland hardwood wetlands, filter out nutrients, and excess sediments and other pollutants to help prevent them from entering nearby tributaries. The loss of these project area aquatic resources would eliminate this function and its contribution to maintaining water quality in downstream waters, such as the Ohio River. Furthermore, the agencies have concerns that, based on the past performance of mitigation efforts in nearby watersheds, proposed efforts to offset impacts to project area aquatic resources may not prove successful.

The affected wetlands and other bottomland forest provide essential habitat for state endangered and federally listed species including Indiana bats (*Myotis sodalis*), northern long-eared bats (*Myotis septentrionalis*), evening bats (*Nycticeius humeralis*), cerulean warblers (*Setophaga cerulean*), northern harriers (*Circus cyaneus*), and copperbelly water snakes (*Nerodia erythrogaster neglecta*). All of these species and several state species of special concern have been documented within the project area. The agencies are concerned about the potential impact of the project on these species.

Indiana has lost eighty-five percent of its wetlands, and large remaining tracts such as those present at the project site are rare. In particular, forested wetlands are a declining resource. According to the National Wetland Reports by FWS, forested wetlands experience the greatest decline of all wetlands types. United Minerals asserts that the additional range of habitat types that would result from reclamation activities at the Seven Hills Mine site will be an improvement over existing conditions. However, given the high acreage of forested wetlands that would be lost, the time it takes for forests to mature, and the poor performance of mitigation on the nearby Somerville and North Millersburg mines, it is highly unlikely that the reclaimed areas will develop habitat that is more productive than what currently exists.

The agencies detailed comments follow.

Independent Utility

The Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine (LRL-2013-444-rjb), which is also operated by United Minerals. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine, are also described in the High Point application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would be considered to have independent utility. Therefore, the agencies' request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosures 1 and 2).

Significant Degradation

In accordance with the Clean Water Act Section 404(b)(1) Guidelines (the Guidelines), the agencies believe that this project as proposed may cause or contribute to a significant degradation of Pigeon Creek.¹ The preamble to the Guidelines states that discharges may not be permitted if they will have "significantly" adverse effects on various aquatic resources. In this context, "significant" and "significantly" mean more than "trivial."

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Secondary impacts include effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.² Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.³

The table below summarizes the cumulative footprints of mining activities in the Highland-Pigeon Creek Watershed and the enclosed map graphically depicts those activities (See Attachment I).

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Total	62,208	97

Within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations in the last 8 years. An additional, 555.86 acres of wetland impacts (including impacts to 463.83 acres of forested wetlands) and 113,187 feet of stream impacts have been identified on the proposed mine sites for the Seven Hills and High Point mines. In total, the permitted and proposed mining activities account for 18,762.6 acres of direct impact, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

¹ 40 CFR 230.1(c)

² 40 CFR 230.11(h)

³ 40 CFR 230.11(g)

The proposed loss of nearly 500 acres of forested wetlands from this project would will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of freshwater inflow to the Ohio River. Pigeon Creek is listed as impaired for E. coli, dissolved oxygen, impaired biotic communities and nutrients and the Ohio River is listed as impaired for B. coli, dioxin, total mercury and PCBs on Indiana's 303(d) list of impaired waters.⁴ Given the algal issues in the Ohio River in 2015, the agencies are also concerned about possible effects in the Ohio River with respect to safe drinking water, wildlife and recreation (see Attachment 2).

In addition to the localized impacts to water quality, the increase of nutrients and specifically nitrogen in watershed has had a demonstrated effect on water quality. The United States Geologic Survey published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The Highland-Pigeon Creek watershed was estimated as one of the watersheds to contribute more than 90% of its nitrogen to the Gulf.⁵ BPA's initial SWAT modeling, which does not include cumulative impacts of mining, indicates that the loss of these wetlands along Pigeon Creek would increase nutrient loads to the Ohio River by over 3,500 pounds annually and increase sediment loads by over 260,600 pounds annually.

Project Area Aquatic Resources

The agencies are concerned that the project's CWA Section 404 discharges may result in unacceptable impacts on the Ohio River, Pigeon Creek, and its forested floodplain wetlands. The bottomland hardwood forests within the Pigeon Creek floodplain are an important and productive habitat. In addition to the habitat value of natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain Indiana Department of Natural Resources (IDNR) wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMLD Development Schedules

⁵ Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

Wabash-Erie Canal and a portion of Pigeon Creek onsite is part of the former canal. Today, the creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as "an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the environment."⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed also help to protect the quality of the Ohio River from nonpoint source pollution from urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River serves as a source of drinking water, hydroelectric energy, shipping route to the Mississippi River, recreation and fishing. There are presently several fish consumption advisories for the Ohio River.⁸

Endangered and Threatened Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), and the federally threatened northern long-eared bat (*Myotis septentrionalis*). An Indiana bat maternity colony from a known primary roost tree has been documented using the southern portion of the proposed project area for foraging, and bat survey results indicate the presence of an additional maternity colony which forages on the northern end of the permit area. Although it has not been addressed in the permit application, at least one northern long-eared bat maternity colony has also been documented in the project area; reproductively active females were captured during bat surveys. The proposed mining activity will temporarily or permanently eliminate approximately 690 acres of summer habitat for these species. The proposed restored forest will not become suitable habitat for many years, if ever.

The copperbelly water snake (*Nerodia erythrogaster neglecta*) is known to have reproducing populations along the Pigeon Creek corridor, with known records of individuals in the project area. This species is federally listed as threatened in the northern part of its range, but listing was precluded in southern Indiana due to the development of a Copperbelly Water Snake Conservation Agreement and Strategy, endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective in avoiding impacts to and conserving copperbelly water snake habitat. This permit application is the first action that the FWS is aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

The following species were also documented within the project area:

⁷ <http://www.evansville.gov/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

State endangered species: northern harrier, least bittern, black-crowned night heron, black tern, Henslow's sparrow, osprey, yellow-headed blackbird, short-eared owl, sedge wren, marsh wren, barn owl, Virginia rail, American bittern, and loggerhead shrike.

Waterfowl: Canada goose, gadwall, mallard, hooded merganser, red-breasted merganser, bufflehead, ruddy duck, wood duck, northern shoveler, lesser scaup, American wigeon, redhead, ring-necked duck, green-winged teal, common goldeneye, northern pintail, snow goose, canvasback, American black duck, tundra swan, greater scaup, cackling goose, white-winged scoter, common merganser, and mute swan.

Scope of NEPA Analysis

The NEPA analysis should include the entirety of the area proposed for mining, including both uplands and aquatic resources. As a result of the proposed Corps' action, there would be direct, indirect, and cumulative human health and environmental impacts beyond the regulated waters, including indirect or cumulative impacts that may be outside of the mine footprint. The NEPA analysis should extend outside of the regulated activity because the "*environmental consequences of the larger project are essentially products of the Corps permit action*".⁹ Further, based on potential impacts to aquatic resources and threatened or endangered species, sufficient Federal involvement exists to expand the scope of the NEPA analysis beyond the regulated activity.¹⁰ Based on the above, the agencies find that the scope of the NEPA analysis should extend outside of the regulated activity, based on potential direct, indirect, and cumulative impacts to resources.

As discussed above under *Independent Utility*, EPA recommends the scope of the NEPA analysis include both the Seven Hills Mine and the adjacent High Point Mine. The analysis should also consider other mines which may be connected-actions¹¹ and/or similar actions.¹² Impacts from nearby mining operations should be analyzed in the same NEPA document.

Preparation of an Environmental Impact Statement

NEPA states that major federal actions which could significantly affect the quality of the human environment require an EIS be prepared. The Council on Environmental Quality (CEQ) has defined "significantly" by two criteria: *context* and *intensity* of impacts of the proposed project.¹³ Seven Hills Mine would cause significant environmental impacts, and, therefore, an EIS should be prepared. We recommend consideration of the following factors regarding significance:

- **Cumulative Impacts:**¹⁴ The proposed mine and the other mining activities would likely lead to impacts to the environment and human health that are cumulatively significant. Mining in this watershed has continued over the last 100 years. A

⁹ 33 CFR Part 325, Appendix B Section 7(b)(2)

¹⁰ 33 CFR 325 Appendix B, Section 7(b)(2)(iv)

¹¹ 40 CFR § 1508.25(a)(1)

¹² 40 CFR § 1508.27

¹³ 40 CFR § 1508.27

¹⁴ 40 CFR § 1508.27(b)(7)

cursor examination of surface coal mining projects within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) in the last 8 years shows that over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations. Additionally, 555.86 acres of wetland and 113,187 feet of stream have been identified on the proposed mine sites, which include Seven Hills and High Point mines. All permitted and proposed mining activities in the last 8 years directly affect 18,762.6 acres, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

Both particulate matter and hazardous air pollutant levels would be expected to increase as a result of continued mining in the area, exacerbating human health problems related to poor air quality. Nearby communities also experience cumulative and multiple impacts related to the mining and processing of coal, such as noise and vibration. Additionally, the eventual combustion of coal mined at Seven Hills and High Point mines would release high levels of greenhouse gas emissions and contribute to climate change. Therefore, because the impacts from the Seven Hills Mine and other proposed mines could potentially have cumulatively significant impacts on human health and the environment, an EIS should be prepared.

- **Unique characteristics of the geographic area:**¹⁵ The mine site includes areas which the agencies consider to be of significant value: Pigeon Creek and the bottomland hardwoods in the Pigeon Creek watershed. The subwatershed (12-digit HUC Clear Branch Pigeon Creek) is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans. The fact that eighty five percent of the wetland resources once present in Indiana have been lost or altered makes remaining wetlands especially critical resources for conservation.¹⁶ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits, such as maintaining the quality of drinking water and controlling flooding, and in environmental benefits, such as providing habitat for wildlife, including threatened and endangered species. The resources proposed for impact onsite are used by an endangered species, a threatened species, and a species listed as threatened in its northern range. Based on the scale of the proposed project's impacts to important aquatic resources and other ecologically critical areas, an EIS should be prepared.
- **Public Health or Safety:**¹⁷ Living near proposed surface coal mines increases exposure to pollutants and other hazards, raising human health concerns, such as cardiopulmonary diseases and cancers, respiratory disease, kidney disease, hypertension, and issues related to psycho-social stressors.¹⁸ Environmental impacts

¹⁵ 40 CFR § 1508.27(b)(3)

¹⁶ Status and Trends Report on State Wetland Programs in the United States.

¹⁷ 40 CFR § 1508.27(b)(2)

¹⁸ Hendryx, M., and Ahern, M. *Relations between health indicators and residential proximity to coal mining in West Virginia*. American Journal of Public Health, 2008; 98: 669-671, Walker, E., PhD and Payne, D., MPH *Health Impact Assessment of Coal and Clean Energy Options in Kentucky*. Rep. Kentucky Environmental Foundation, n.d. Web 19 Nov. 2015

from surface coal mining, processing, and burning that contribute to human health include, but are not limited to, water contamination, air emissions, noise, vibration, and flooding. Federally enforceable state regulations prohibit visible emissions from mining activities from crossing property lines,¹⁹ though mine blasting may not be able to meet that requirement. Demographic data indicate a high percentage of children living in the area are under the age of five. Children are particularly vulnerable to impacts from exposures to air pollutants. Environmental data show high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. We are concerned about cumulative impacts to the surrounding communities given that Seven Hills Mine would be located near other operating and proposed mines, further exacerbating existing exposures. Based on the potentially significant impacts to public health and safety, an EIS should be prepared.

- **Threatened and Endangered Species:**²⁰ As discussed above, the proposed Seven Hills Mine is within the range of the endangered Indiana bat (*Myotis sodalis*) and the threatened Northern long-eared bat (*Myotis septentrionalis*) and these species have been documented using the site. Additionally, the Copperbelly watersnake (*Nerodia erythrogaster neglecta*) is known to have breeding populations along Pigeon Creek. Because there are potentially significant impacts to threatened or endangered species, an EIS should be prepared.

The agencies note that preparation of an EIS for a surface coal mine would not set a new precedent for the analysis of impacts to human health and the environment. EISs have been prepared for coal mines with similar scopes of impacts, such as:

- Fort Worth Corps District is currently considering a Regional Draft EIS for Surface Coal and Lignite Mining in Texas (Draft EIS CEQ #20150191);
- Fort Worth Corps District prepared an EIS for the Rusk Mine in Texas (Final EIS CEQ #20110148);
- Fort Worth Corps District prepared an EIS for the Three Oaks Mine in Texas (Final EIS CEQ #20030199); and
- Louisville Corps District previously issued an EIS for the Delta Coal Mine Complex in Illinois (Final EIS CEQ #19960416).

The NEPA process allows the Corps to fully consider potential impacts and measures to avoid, minimize, and mitigate those impacts as a means to achieve more informed decision-making and better project outcomes. The scope of analysis for the NEPA document on the proposed Seven Hills Mine should cover the entire mine site, including both uplands and aquatic resources, and the entirety of High Point Mine. Due to potentially significant cumulative impacts, adverse impacts to threatened and endangered species, impacts to unique characteristics of the geographic area, and risks to public health and safety, the agencies believe the Corps should prepare an EIS.

¹⁹ 326 Indiana Administrative Code 6-4-2

²⁰ 40 CFR§ 1502.27(b)(9)

Mitigation and Monitoring

The applicant proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 19.81 acres palustrine emergent, 13.43 acres of palustrine emergent, and 1.04 acres of palustrine-unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial stream, using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.²¹ An in-depth discussion regarding mitigation is premature without first considering additional avoidance and minimization efforts to help ensure that proposed discharges represent the least environmentally damaging practicable alternative. However, the agencies have reviewed the proposed on-site and off-site compensatory mitigation plans and offer the following general comments at this time to help improve the mitigation plan.

The mitigation plan does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, it is imperative to take connectivity into account when designing mitigation.

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. Forested wetlands experience the greatest decline of all wetland types and are extremely difficult to restore or create.

EPA and FWS recommend that the applicant be required to mitigate for bottomland hardwood forest at a ratio of 4:1. This ratio is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.²² For mitigation to be considered successful, performance standards in the mitigation plan would have to be achieved. It is our understanding that the hydrology will not be re-established until the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (rather than the mitigation proposed at the "avoided" areas).

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and success in generating functional lift is often

²¹ 40 CFR 230.91(c)

²² 40 CFR 230.93(f)(2)

elusive. The FWS asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland forest associated with the North Millersburg Mine. The finished topography on much of the reclaimed area was too high in elevation to function as bottomland forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments looks more like rolling hills than floodplain. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Final Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally done by applying appropriate ratios so that the amount of compensation will be adequate to offset the authorized impacts even if the mitigation is not 100% successful.

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the proposed mine boundary and discusses how restoration in areas east of Pigeon Creek will allow for streams and wetlands to interact hydrologically during periods of overbank flooding. However, it is unclear how this interaction will be affected given the existing levee that runs along the east edge of Pigeon Creek, directly west of a portion of the proposed on-site mitigation. The floodway modification plan for this area is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for forested wetland based on the referenced study. Additional clarification on the determination of 2,500 acres as the contributing cumulative watershed is needed. The mitigation plan does not detail how the proposed stream and wetland mitigation will tie in with aquatic resources adjacent to the site boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results from attempting to restore streams in mined areas. It is likely that the intermittent and ephemeral streams would not have adequate flow, which will impact existing uses in the compensatory mitigation streams. Considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

In addition to the on-site reclamation, the applicant proposes off-site mitigation on 575.9 acres on Greathouse Island, an abandoned oxbow of the Wabash River, in Posey County, Indiana. Proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 258.9 acres of existing forested wetland. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact, and while it may provide some benefits to the Ohio River, to which the Wabash River is a tributary, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. Permittee-responsible mitigation (PRM) projects are designed to offset specific impacts, and are therefore more likely to reduce the severity of project site impacts. The off-site PRM proposed on Greathouse Island appears to be intended to offset functional losses, however, they would not occur within the project footprint and would not result in functional gains within the watershed. According to the application, the enhancement areas will be selectively harvested to reduce the existing canopy cover by 50 percent. It is

unclear how harvesting trees from an existing forested wetland will provide mitigation for forested wetland impacts. The instability of the proposed site is also of concern. This site is a remnant meander of the Wabash River that is part of a dynamic system within a floodplain. Upstream hydrologic processes and perturbations will control hydrology in this area, including reactivating former channels and influencing channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity.

The applicant claims that the off-site mitigation will provide additional habitat for the federally endangered Indiana bat, as well as several other bat species. While the mitigation, if successful, will provide habitat for the Indiana and northern long-eared bat, it will take several years before it is suitable foraging habitat and many more years before it becomes suitable roosting habitat, if ever. Also, the off-site mitigation will not provide any benefit to the known maternity colonies in the proposed project area, as both Indiana and northern long-eared bats display high site fidelity, returning to the same roosting habitat year after year.

While the objectives of the mitigation area are to provide flood, sediment, and nutrient storage for the Wabash River, there is no indication of the degree or level of functional lift provided compared to existing conditions, how that lift would benefit the watershed of impact or the likelihood of success given the activities proposed. Because it will take some years before the off-site mitigation is established, and it is nearly 40 miles and two watersheds away from the impact area, it is unlikely to offset either the temporal or cumulative loss of wetlands. EPA and FWS recommend the applicant explore mitigation opportunities within the impacted watersheds specified in the IDEM June 2003 Highland-Pigeon Creek Watershed Management Plan.

Monitoring and Long Term Management

The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas. The Guidelines state that "financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments".²³ The increase in coal companies filing for Chapter 11 Bankruptcy²⁴ and the inherent risk in re-creating streams and wetlands on-site in the post mining landscape necessitate the establishment of appropriate financial assurances.

To comply with the Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs and annual cost estimates for these needs, and should identify the funding mechanism that will be used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

²³ 40 C.F.R. §230.93(n)(2)

²⁴ <http://www.businessfinancenews.com/24344-is-arch-coal-inc-on-the-verge-of-chapter-11-bankruptcy/>

May. 2. 2016 3:04PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 45

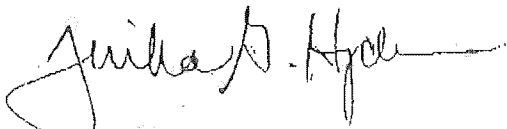
An adaptive management plan is provided, however, it does not include a root cause analysis or describe necessary corrective actions if insufficient hydrology makes stream restoration infeasible.

As part of the monitoring program for affected and reconstructed streams, physical, chemical and biological monitoring should be required. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

Thank you for your consideration of our comments and recommendations to aid in the evaluation of project impacts to environmental resources within the Pigeon Creek Watershed, consistent with the requirements of the NEPA, CWA and ESA. We look forward to discussing these comments with you. Prior to the closing of the public comment period additional CWA Section 404 comments will be forthcoming. Please contact Wendy Melgin from the U.S. Environmental Protection Agency at melgin.wendy@epa.gov or (312) 886-07745 and Marissa Reed from U.S. Fish and Wildlife Service at marissa_reed@fws.gov or (812)334-4261 with any questions.

Sincerely,



Tinka Hyde
Director, Water Division
U.S. Environmental Protection Agency



Scott Pruitt
Field Supervisor
U.S. Fish and Wildlife Service

Enclosures
Attachments

cc: Martha Clark-Mettler, IDEM
David Carr, IDEM
LeAnne Devine, USACE-Louisville District
George DeLancey, USACE-Louisville District
Bob Krska, USFWS-Regional Office, Bloomington, MN
Jason Miller, USFWS-Headquarters, Falls Church, VA

May. 2. 2016 3:04PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 46

Enclosure 1

May. 2. 2016 3:05PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 47



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

NOV - 6 2013

REPLY TO THE ATTENTION OF:
 WW-16J

U.S. Army Corps of Engineers, Louisville District
 ATTN: Mr. George DeLancey, CELRL-OP-FW
 P.O. Box 489
 Newburgh, Indiana 47629-0489

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Mr. DeLancey:

The U. S. Environmental Protection Agency has reviewed the preliminary Clean Water Act (CWA) Section 404 permit application (permit application) for the subject project. Under United Minerals Company, LLC's preliminary proposal, approximately 458.2 acres of wetlands (of which 401.5 acres are forested) and 31,762 linear feet of streams, would be impacted for the construction of the 2,351.2-acre Seven Hills Mine in the Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 1,370.3 acres of the site has been previously mined. Two distinct previously mined areas lie in the eastern and southern portions of the permit area. We offer the following comments based on our review of the preliminary permit application.

Land Use/Existing Conditions

A November 2010 letter from the United States Fish and Wildlife Service (USFWS) to the Indiana Department of Natural Resources (IN DNR) commenting on the Surface Mining Control and Reclamation Act (SMCRA) permit application for the Seven Hills Mine, conveyed serious concerns about proposed impacts to wetlands and other bottomland forest along Pigeon Creek that provide abundant habitat for numerous and significant wildlife species, including migratory birds, the Copperbelly water snake (*Nerodia erythrogaster neglecta*), and the federally endangered Indiana bat (*Myotis sodalis*). In addition to the habitat value of these natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.¹ Forested wetlands are ecologically important systems and represent some of the most diverse, complex, and productive freshwater wetlands in the Nation. In spite of their high value, these systems have experienced significant decline in

¹ <http://water.epa.gov/type/wetlands/bottomland.cfm>

area throughout the United States. Between 2004 and 2009, forested wetlands declined by an estimated 633,100 acres. This trend in forested wetlands loss only heightens the significance of any additional loss of these resources.²

United Minerals Company, LLC (UMC) asserts that the additional range of habitat types that would result from reclamation at the Seven Hills Mine site will be an improvement over existing conditions; however, this assertion is not supportable given the high acreage of forested wetlands that would be lost.

Alternatives Analysis

The preliminary application information does not provide an adequate range of alternatives that avoid and minimize impacts to aquatic resources at the project site to the maximum extent practicable under the CWA Section 404(b)(1) Guidelines (Guidelines). The amount of effort and level of detail included in the analysis must be commensurate with the level of aquatic resources impacted, which EPA believes to be significant in this case. EPA strongly recommends the applicant provide alternatives that include considerable avoidance of valuable bottomland wetland habitat. For example, UMC should consider alternatives that include mining from the eastern portion of the site (which includes previously mined areas) towards the west, up to the bottomland wetland areas (leaving a sufficient buffer), and augering under the wetlands. UMC makes a general statement in the permit application that "historically augering activities have proven to not be cost effective in most circumstances."

EPA understands that more coal can be extracted using the open pit method than the augering method; however, no information is provided to demonstrate that augering is cost prohibitive specific to this project. The practicability of each alternative should be considered in light of cost, logistics, and available technology and evaluated at a level that reflects the significance of the resources to be impacted.

Cumulative Impacts

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines, the applicant should prepare a cumulative impacts analysis that details changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct and indirect impacts from previous and current actions as well as impacts from future actions as a result of changes in surface and groundwater hydrology.

The cumulative impacts analysis should also discuss potential ecological impacts associated with the loss of forest cover and forest fragmentation along the Pigeon Creek bottomlands. As mentioned above, USFWS expressed this as a serious concern in its November 2010 letter to IN DNR. The mining activity would temporarily or permanently eliminate at least 600 acres of summer habitat for the endangered Indiana bat (*Myotis sodalis*) and valuable habitat for other

² United States Fish and Wildlife Service. 2011. *Status and Trends of Wetlands in the Conterminous United States 2004 to 2009*.

species such as the Copperbelly water snake (*Nerodia erythrogaster neglecta*). EPA understands that listing of this species in southern Indiana was precluded due to development of a *Copperbelly Water Snake Conservation Agreement and Strategy* (Agreement) endorsed by the USFWS, IN DNR, and the Indiana Coal Council, which is now expired. According to the USFWS, since the expiration of the Agreement, all parties have continued to implement the goals of the Agreement voluntarily, to avoid and conserve Copperbelly water snake habitat. This permit application is the first USFWS is aware of that would not follow the tenants of the Agreement.

A Clean Water Act Section 404 permit was issued for the nearby Liberty Mine, LRL-2010-218-gjd, in April 2012. The permit authorized impacts to 8,948 feet of perennial streams, 5,183 linear feet of intermittent streams, 6,212 linear feet of ephemeral streams, 35.3 acres of forested wetlands, 63.3 acres of emergent wetlands, and 0.8 acre of scrub-shrub wetlands. In addition, the recently proposed High Point Mine (LRL-2013-444-rjb) is approximately 3084.6 acres in size and abuts the proposed site. According to Robert Brown of your office, the proposed High Point Mine would impact approximately 27 acres of wetlands and 63,000 linear feet of streams. This mine would also be operated by UMC. EPA requests that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. They are abutting UMC mines, appear to be at similar stages of development in the permitting process, and the preparation plant serving both operations would be constructed on the High Point Mine site.

Environmental Justice Concerns

Based on the limited information provided in the permit application and other environmental and demographic data, EPA believes the proposed mine may raise environmental justice concerns. Demographic data indicate there are both high percentages of low-income individuals and children under the age of five, who are particularly vulnerable to impacts from mining operations. Environmental data shows high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. EPA is concerned that communities would potentially be disproportionately impacted by the proposed mine. Further, EPA is concerned about cumulative impacts to the surrounding communities, given that the proposed mine would be located near an operating mine, further exacerbating existing exposures to sensitive populations.

Preparation of an Environmental Impact Statement

Section 102(2)(C) of NEPA identifies major federal actions that "significantly" affect the quality of the human environment requiring an environmental impact statement (EIS). In regulations the Council on Environmental Quality promulgated under NEPA, "significantly" is defined by two criteria: context and intensity of impacts of the proposed project.³ 'Context' refers to the affected environment in which a proposed action would occur and 'intensity' means the degree to which the proposed action would include one or more of the factors listed below, among others. The Seven Hills Mine, as currently proposed, appears to exceed thresholds for significance based on the context and intensity of the project. Therefore, EPA strongly recommends that the Corps prepare an EIS for this project for the following reasons:

³ 40 CFR § 1508.27

- **Unique characteristics of the geographic area:** The Seven Hills Mine would impact approximately 458.2 acres of wetlands and 31,562 linear feet of streams. The impacted subwatershed is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans.⁴ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits, such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or altered makes wetlands especially critical resources for conservation.⁵ Because of the scale of the proposed project's impacts to ecologically critical areas, EPA views the preparation of an EIS as appropriate.⁶
- **Public Health or Safety:** As discussed above, the proposed mine may raise environmental justice concerns. Adjacent communities include a high number of low-income individuals and a high number of children under the age of five. These populations are more sensitive to impacts and potentially experience unique exposure pathways. Communities may be exposed to multiple mine-related impacts, including fugitive dust, noise, and water discharge. Based on this, the potential for public health and safety risks are increased and an EIS should be prepared.⁷
- **Cumulative Impacts:** As mentioned in the comments on Cumulative Activity, Seven Hills Mine would be located near an active mine and abutting a proposed mine. Additional mining activities would likely lead to impacts that are cumulatively significant.⁸ The cumulative impacts from the Seven Hills Mine and other proposed mines could potentially have significant impacts on human health and the environment, and would be grounds for the preparation of an EIS.
- **Threatened and Endangered Species:** As discussed above, the proposed Seven Hills Mine is within the range of Indiana bat (*Myotis sodalis*) maternity roosting habitat (endangered) and the Copperbelly watersnake, which has been previously proposed for inclusion on the federal threatened species list for this area. Potential impacts to threatened or endangered species are considered grounds for the preparation of an EIS.⁹

As discussed above, EPA believes the proposed project should be analyzed in conjunction with other similarly proposed projects in the area, including the High Point Mine. The operation of both mines relies on shared infrastructure, including the preparation plant, which is located within the proposed footprint of High Point Mine. This qualifies the permitting of both mines as connected actions,¹⁰ which should be analyzed in one NEPA document.

⁴ <http://ai.org/idem/mps/3241.htm>

⁵ Indiana Department of Natural Resources, 1996, *Indiana Wetlands Conservation Plan*.

⁶ 40 CFR § 1508.27(b)(3)

⁷ 40 CFR § 1508.27(b)(2)

⁸ 40 CFR § 1508.27(b)(7)

⁹ 40 CFR § 1508.27(b)(9)

¹⁰ 40 CFR 1508.25(a)(1)

Mitigation and Monitoring

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.¹¹ An in-depth discussion regarding mitigation is premature given the applicant first needs to adequately address avoidance and minimization. However, per the Corps' request, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following general comments at this time to help improve the mitigation plan.

- The applicant needs to document how avoided stream reaches will be preserved or affected during mining and what that will mean for reconstructed stream reaches in terms of flow regime.
- The applicant needs to explain the rationale behind selecting the proposed performance goals of EPA Rapid Bioassessment Protocol (RBP) scores of at least 115 for intermittent stream mitigation reaches and at least 110 for ephemeral stream mitigation reaches. EPA recommends that the applicant locate reference reaches in the area to use as a guide to develop stream mitigation goals. As you know, reference conditions in the region can be used to scale the assessment to the "best attainable" condition for mitigation reaches.
- The mitigation ratio proposed for forested wetland is 2:1. The proposed mitigation ratio is too low given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. EPA recommends that the applicant be expected to mitigate for bottomland hardwood forest at a ratio of 4:1.
- The off-site wetland mitigation proposal is in need of significant improvement. More detail on the existing conditions of the mitigation areas, especially those proposed for preservation and enhancement, is necessary to determine the merit of the proposal.
- The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas.
- As part of the monitoring program for affected and reconstructed streams, biological monitoring should be required to ensure there is no degradation to the communities that inhabit the streams. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

In conclusion, we strongly recommend that the Corps consider our recommendation to prepare an EIS for this project and our comments above to protect the significant resources within the Pigeon Creek bottomlands. Thank you for the opportunity to review the preliminary application for the Seven Hills Mine. We look forward to discussing these comments with you. Please

¹¹ 40 CFR 230.91(c)

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 52

contact Melissa Blankenship of our office at (312) 886-6833 or (503) 326-5020 with any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Peter Swenson". The signature is fluid and cursive, with the first name "Peter" and last name "Swenson" clearly distinguishable.

Peter Swenson, Chief
Watersheds and Wetlands Branch

cc: David Carr, IDEM
Scott Pruitt, USFWS-Bloomington
James Townsend, USACE-Louisville District

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

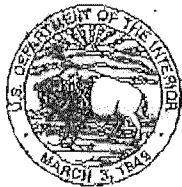
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Enclosure 2

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 54

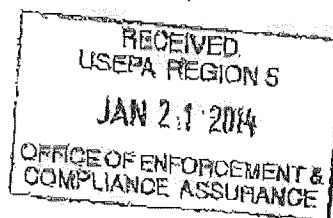
Elizabeth F. Fide

United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 10, 2014



Mr. George DeLancey
U.S. Army Corps of Engineers
CELRL-OP-FW
P.O. Box 489
Newburgh, IN 47629-0489

Dear Mr. DeLancey:

This responds to your letter of August 13, 2010 requesting U.S. Fish and Wildlife Service (FWS) comments on a permit application (LRL-2013-635) for the United Minerals Company, LLC proposed Seven Hills Mine (S-00357) in Warrick County, Indiana.

These comments are consistent with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service's Mitigation Policy, and the Indiana Coal Mining Regulatory Program, Section 310 IAC 12-3-107.

The proposed permit area covers 2351 acres. The proposed water resource impacts include over 31,762 feet of stream channel (2,589 feet ephemeral, 28,973 feet intermittent, and 200 feet perennial), approximately 458 acres of wetlands (401.5 forested, 4.45 emergent, and 52.15 shrub), and 29 acres of open water.

The permit area contains a combination of undisturbed bottomland along Pigeon Creek, including approximately 7,876 feet of the Pigeon Creek channel, and previously mined land in the North Millersburg, South Millersburg and Ayrshire mines. Most of the previously mined land has been reclaimed to a mixture of forest, wildlife land and agricultural land.

Wildlife Habitat

The affected wetlands and other bottomland forest provide abundant habitat for numerous and significant wildlife species, including migratory birds, Indiana bats (*Myotis sodalis*), Northern long-eared bats (*M. septentrionalis*), and the copperbelly water snake (*Nerodia erythrogaster neglecta*). We do not have a comprehensive bird species list for the permit area, however bird surveys by Audubon Society members in the Buckskin Bottoms area north (upstream) of the

Page 2 of 4

permit area reported over 180 species of birds including 9 species listed at that time as State-endangered species.

An Indiana bat maternity colony from a known primary maternity roost tree has been documented using the southern portion of the proposed permit area for foraging, and bat survey results suggest the presence of an additional maternity colony which forages on the northern end of the permit area. The proposed mining activity would temporarily or permanently eliminate approximately 690 acres of summer habitat for this species and restored forest will not become suitable habitat for many years.

At least one Northern long-eared bat maternity colony has also been documented using the permit area with the capture of reproductively active females during bat surveys. Northern long-eared bats generally require similar summer habitat to that of Indiana bats, therefore the proposed mining activity would impact approximately 690 acres of habitat for this species.

The copperbelly water snake is known to have reproducing populations along the Pigeon Creek corridor. Listing in southern Indiana was precluded due to development of a Copperbelly Water Snake Conservation Agreement and Strategy endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective at avoiding and conserving copperbelly water snake habitat. This permit application is the first action we are aware of that would not follow the tenets of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

Mitigation

A thorough review of the proposed mitigation has not been conducted; however, the FWS asserts that wetlands of this magnitude and in this landscape location cannot be adequately restored based on the failure of previous efforts associated with the North Millersburg Mine. The North Millersburg mined land on the east side of the Pigeon Creek floodplain was to have been restored to its pre-mining condition of bottomland forest, however the actual restoration consisted chiefly of a mixture of upland fields, upland non-forested wildlife habitat and large, shallow permanent impoundments.

Cumulative Impacts

The proposed Seven Hills Mine, in combination with the two previous Millersburg Mines, would permanently or temporarily eliminate the vast majority of approximately 4000 acres of habitat along the Pigeon Creek corridor. As previously stated in this letter, the bottomland forest in the North Millersburg permit area was permanently lost. In addition, the newly proposed High Point Mine would impact approximately 2,500 acres of wildlife and forest habitat, including 27 acres of wetlands and 63,000 linear feet of streams.

A November 2013 letter from the U.S. Environmental Protection Agency (EPA) to the U.S. Army Corps of Engineers (Corps) requests that the Corps treat the High Point Mine and the Seven Hills Mine as a single project. The FWS supports this request since the mines have overlapping permit boundaries and will share a coal processing plant.

Endangered Species

The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*), sheepsnose mussel (*Plethobasus cyphus*) and the northern long-eared bat (*M. septentrionalis*), a species proposed as endangered under the Endangered Species Act. The sheepsnose mussel is restricted to the Ohio River and will not be impacted by the proposed mining operation.

As stated previously, there is known summer habitat for Indiana and northern long-eared bats present throughout the permit area, and the proposed mining operation will eliminate a significant amount of habitat for these species. In accordance with our national biological opinion issued to the Office of Surface Mining, United Minerals Company developed an Indiana Bat Protection and Enhancement Plan (PEP) outlining measures to minimize take of Indiana bats. To date, the northern long-eared bat has not been addressed.

The northern long-eared bat was proposed for federal listing under the ESA on October 2, 2013. Species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against take applies. The final listing decision for the northern long-eared bat is expected in October 2014. This could cause project delays, since potential adverse effects to the northern long-eared bat have not been previously addressed. Therefore, the FWS strongly encourages applicants to address the northern long-eared bat while it is proposed for listing. Interim guidance on addressing impacts to northern long-eared bats can be found online at

<http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>

In conclusion, the FWS continues to oppose a mining plan that will substantially alter the Pigeon Creek bottoms and result in hundreds of acres of wetland impacts. We recommend that the mining operation be altered to avoid mining disturbance in existing forest and wetland habitat in the Pigeon Creek floodplain.

Due to the extensive wildlife habitat proposed under this mining plan, and the extent of cumulative impacts of mining in the Pigeon Creek bottomland corridor, we believe that development of an Environmental Impact Statement is appropriate.

The FWS considers the Pigeon Creek floodplain to constitute a productive and valuable public resource which serves significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting habitat for aquatic and land species. As defined by the Section 404(b)(1) Guidelines, we consider the site to be a Special Aquatic Site that possesses special ecological characteristics of productivity, habitat, wildlife protection and

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other important and easily disrupted ecological values. Therefore, the U.S. Fish and Wildlife Service requests that this permit be denied.

Pursuant to Part IV, Paragraph 3(a) of the Memorandum of Agreement Between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act dated December 21, 1992, it is the opinion of the Department of the Interior that the project may result in substantial and unacceptable impacts to aquatic resources of national importance.

We are providing this letter to reserve the option to elevate this individual permit action if significant differences remain between our agencies over the disposition of this permit, in accordance with the Memorandum of Agreement (MOA) between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act, dated December 21, 1992. Pursuant to Part IV, Paragraph 3(b) of the MOA, it is the opinion of the Department of the Interior that the project will result in substantial and unacceptable impacts to aquatic resources of national importance.

For further discussion, please contact Marissa Reed at (812) 334-4261 ext. 1215 or marissa_reed@fws.gov.

Sincerely yours,



Scott E. Pruitt
Field Supervisor

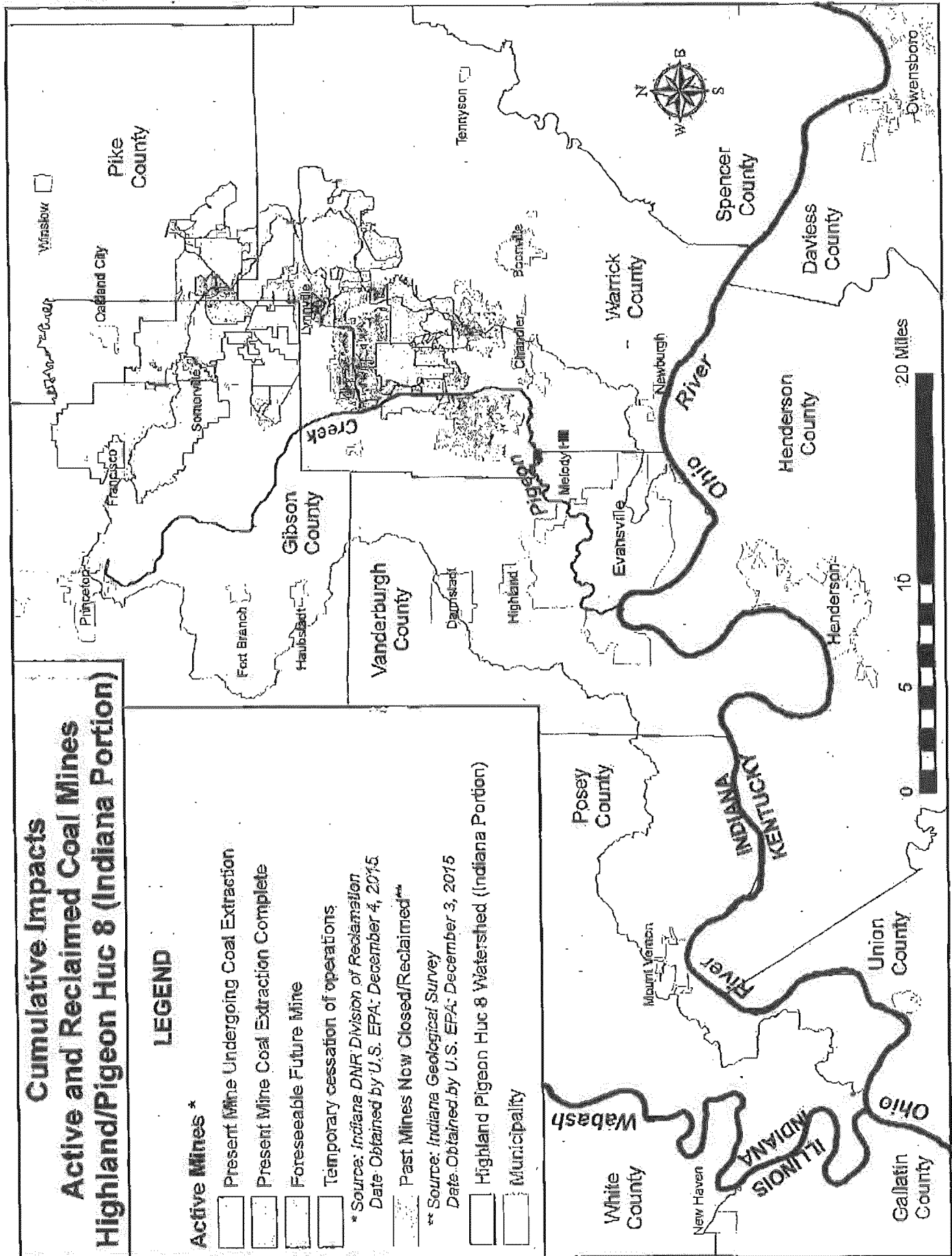
cc: Ramona Briggeman, IDNR Division of Reclamation, Jasonville, IN
Eric Langer, IDNR Division of Reclamation, Jasonville, IN
Melissa Blankenship, US EPA, Chicago, IL

May. 2. 2016 3:07PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 58

Attachment 1



May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

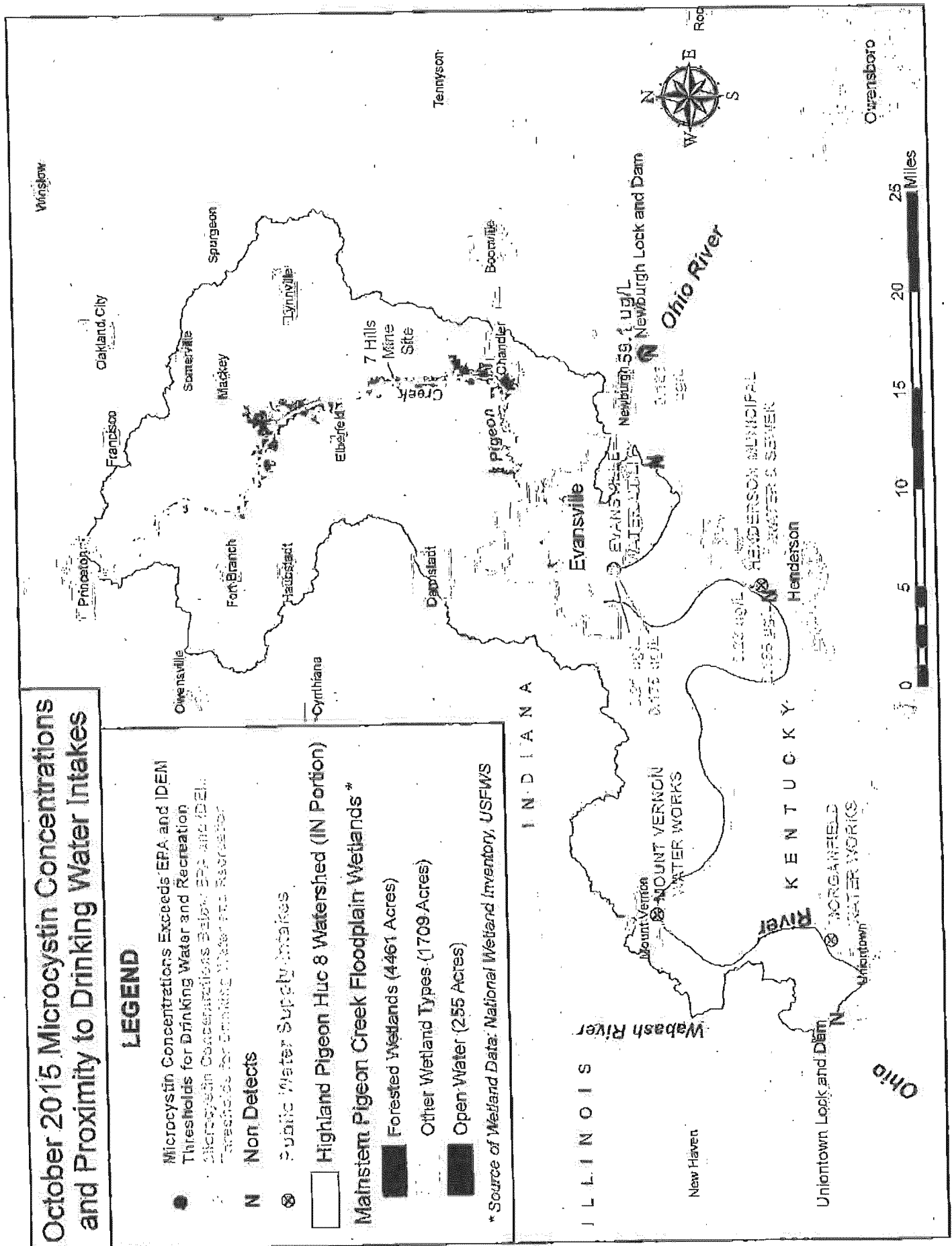
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Attachment 2

May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 61



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US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 62

Enclosure 2
Millersburg II Mine Documents

May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 63

AUG 06 1997

WW-16J

Colonel Ralph Grieco
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Attention: Mr. Ron Sadri, Reference No. 199501367-rjs

Dear Colonel Grieco:

This is in response to your Pre-Construction Notice for activities proposed by Peabody Coal Company at their Millersburg II North operations near Pigeon Creek in Warrick County, Indiana. Peabody is requesting authorization under Nationwide Permit No. 21 for discharges into approximately 50 acres of Palustrine Forested (PFO) wetlands associated with their proposed surface coal mining activity.

We have reviewed the materials you provided and we believe that the proposal, as presently stated, does not meet the requirements for the Nationwide permit because (1) the applicant has not avoided or minimized adverse impacts to the maximum extent practicable, and (2) the applicant's proposed mitigation does not fully address the loss of functions and values that will occur as a result of the mining activity.

The Pigeon Creek corridor is a locally important aquatic resource that cannot easily be replaced. Therefore, impacts to the corridor should be avoided to the extent possible, and unavoidable impacts should be mitigated within the corridor. A major impact to the corridor is a levee shown in the materials you provided. It appears that adverse impacts to the corridor could be significantly reduced by relocating the levee to the toe of the slope. Unless the applicant can demonstrate that this action is totally impracticable, we recommend that you require the applicant to relocate the levee.

The applicant's proposed mitigation is insufficient to replace the functions and values of PFO wetland, especially in view of the location of the proposed off-site mitigation, time needed for restoration of PFO functions and values, and the uncertainty of success.

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2

Because of the value of the Pigeon Creek corridor, we recommend that the applicant make every effort to locate the mitigation area within the corridor. Given the size of the project area, it appears that the applicant could restore additional PFO wetlands within the corridor.

Since the time frame for PFO restoration is very long and because PFO restoration has had a high rate of failure, we recommend that you require a mitigation ratio of at least 2:1, which would require the applicant to produce 100 acres of PFO wetland. We recommend that at least 50 acres of this mitigation be within the Pigeon Creek corridor.

Because of inherent problems in successfully creating 100 acres of PFO wetlands, monitoring during the earthmoving and grading phases is critical. The proposed mitigation plan does not contain enough information to indicate that sufficient monitoring and corrective actions will take place at this time. Therefore, the mitigation plan should require additional monitoring by staff or other representatives of your office who are experienced in PFO restoration, and the permit should clearly state that the applicant will be required to take any corrective actions that you determine necessary as a result of the monitoring.

In summary, it appears that without further avoiding, minimizing, and mitigating adverse impacts, this project does not meet the requirements for the Nationwide permit. If these issues cannot be successfully addressed, we recommend that you require the applicant to apply for an individual Section 404 permit for the proposed activity.

My staff is available to discuss resolution of these issues with you and the applicant. If you have any questions, please call Mr. Thomas Glatzel of my staff at (312) 886-6670.

Sincerely,

Kevin M. Pierard, Chief
Watersheds and Nonpoint Source Programs Branch

cc: U.S. Fish and Wildlife Service, Bloomington IN
Indiana Dept of Environmental Management, Indianapolis IN
Indiana Department of Natural Resources, Indianapolis IN

08/01/97 / DS
8/1/97
8-4-97

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 65

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

C. H. Hall

August 20, 1997

Operations Division
Regulatory Branch (South)
ID No. 199501367-rjs

RECEIVED

AUG 25 1997

Mr. Andrew Short
Peabody Coal Co.
Lynville Business Unit
P.O. 7
Lynville, IN 47619

Dear Mr. Short:

This is in regard to your application requesting authorization for construction of a levee, and surface coal mining and reclamation activities in Warrick County, Indiana. The area is adjacent to Pigeon Creek and is also specified as IDNR Permit No. S-00326, and is also known as the Millersberg II North permit. We have reviewed the submitted data to determine whether a Department of the Army (DA) permit will be required under the provisions of Section 404 of the Clean Water Act.

As stated by Peabody Coal Co. (Peabody) the IDNR permit area includes 68 acres of jurisdictional wetlands. Approximately 50 acres of the wetlands would be disturbed. Of the 50 acres, only 4.6 acres would be in the actual surface mining area, and 23.6 acres would be for areas of surface disturbance in the proposed mining operation (silt basins, ditches, runoff from silt basins, levee). An additional 21.8 acres would be in an area of temporary surface disturbance for a heavy equipment crossing. The disturbance for a heavy equipment crossing was approved by letter dated April 3, 1997, from this office as part of a "Temporary road for moving mining machinery" under 33 CFR 323.4 (Discharges not requiring permits).

To minimize the impacts of the proposed coal mining operation, Peabody has redesigned the mining operation to avoid disturbing 190.8 acres of jurisdictional wetland. This would include areas designated as "habitat area" in the National Conservation agreement for the Northern Copperbelly water snake.

As mitigation for this proposal, Peabody proposes both on and off-site mitigation. There would be 25.0 acres in the off-site mitigation area, and 40.1 acres of wetlands in the on-site area within permit No. S-00326. The wetland type would be of a bottomland hardwood wetland (PFO1B).

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 66

The information supplied by you was distributed to the coordinating agencies in a Pre-Construction Notification (PCN). The responses received within the coordination period were from the U.S. Fish & Wildlife Service, Bloomington, IN, the U.S. Environmental Protection Agency, Chicago, IL. We have also received a response from the Indiana Department of Natural Resources after the comment period ended. Copies of the agency responses have been provided to you earlier.

The agency responses are essentially in four areas, (1) reduction of further impacts by relocation of the levee, (2) detailed mitigation standards for the on and off-site mitigation areas, (3) impacts to endangered species, and (4) requests that a Corps inspector or an independent consultant be used to oversee all phases of the bottomland forest reclamation.

This office has reviewed the information supplied by Peabody for different mining permits proposed for this area, and we appreciate the efforts taken to minimize the impacts to wetland. We would like to ensure the successful completion of the proposed wetland mitigation. We have also reviewed the supplemental information provided by Peabody in their letters dated August 18, 1997, and August 20, 1997.

Based upon our review of the submitted data, the responses to the PCN and provided this activity is authorized by the State of Indiana Surface Mining and Reclamation Program under Title V of the Surface Mining and Control and Reclamation Act of 1977, your proposal would qualify for Nationwide authorization under 33 CFR 330, No. 21 (Surface Coal Mining), as published in the Federal Register, dated December 13, 1996 provided you comply with the enclosed General Conditions and the following Special Conditions:

1. The mitigation plan is part of the reclamation plan approved by the State of Indiana Surface Mining Program for IDNR permit No. S-00326, and any subsequent revisions.
2. Peabody shall construct a minimum of 25 acres of forested bottomland hardwood jurisdictional wetland at the off-site mitigation area, and a minimum of 40 acres of forested bottomland jurisdictional wetland at the on-site area on permit No. S-00326.
3. Peabody shall by January 31, 1998, submit to this office for approval a detailed wetland mitigation plan for both the on-site and off-site mitigation areas. This plan would be in accordance with the "Wetland Compensatory Mitigation and Monitoring Plan Guidelines for Kentucky". Peabody shall make any

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078

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changes to the plan requested by this office during the review process.

4. Peabody shall agree to contract an outside independent consultant with expertise in wetland mitigation to prepare detailed plans, and provide monitoring/Inspection services to ensure the success of the forested wetland mitigation areas.

This authorization will be effective as soon as we receive your signed acceptance of the conditions. Please sign and date the duplicate copy of this letter in the space provided and return the signed copy in the enclosed envelope. Note that we also perform periodic inspections to ensure compliance with our permit conditions and applicable Federal laws.

If you have any questions, please contact this office by writing to the above address, ATTN: CEORL-OP-FS or by calling Mr. Ronny J. Sadri at (502) 582-5452. Any correspondence on this matter should refer to our ID No. 199501367-rjs.

Sincerely,

ORIGINAL SIGNED

Daniel L. Evans
Chief, South Section
Regulatory Branch

Enclosure

(I accept the conditions of this authorization)

Peabody Coal Co.

Date

May. 2. 2016 3:09PM US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 68

ADDRESSES FOR COORDINATING AGENCIES

Mr. David Schulenberg
Chief, Wetlands Regulatory Section
WQW-16T
U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

Mr. Dave Hudak
Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
620 South Walker Street
Bloomington, Indiana 47403-2121

Mr. Steve Jose
Division of Fish and Wildlife
Department of Natural Resources
402 West Washington Street, Room 273
Indianapolis, Indiana 46204

Mr. David Phillips
Division of Reclamation
Indiana Department of Natural Resources
RR # 2, Box 129
Jasonville, IN 47438

Inspection Crew (Sparks)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAY 10 2016

REPLY TO THE ATTENTION OF:

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

RECEIVED

MAY 17 2016

BY _____

Dear Colonel Beck:

On April 14, 2016, the U.S. Environmental Protection Agency reviewed and commented on the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana.

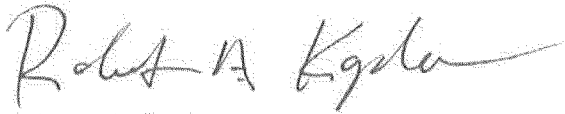
The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service. As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

In the April 14, 2016 letter, the EPA indicated that the proposed project may result in substantial and unacceptable impacts to aquatic resources of national importance (ARNI) in accordance with Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

No additional information has been provided that addresses EPA's concerns. Therefore, pursuant to Part IV, paragraph 3(b) of the August 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army regarding section 404(q) of the CWA, EPA finds that this project, as proposed, will have substantial and unacceptable impacts to aquatic resources of national importance.

Thank you for the opportunity to provide comments on this project. Please contact Wendy Melgin at (312) 886-7745, with any questions you may have.

Sincerely,

A handwritten signature in dark ink, appearing to read "Robert A. Kaplan". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Robert A. Kaplan
Acting Regional Administrator

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)
Scott Pruitt, US Fish and Wildlife Service (via email)
Martha-Clark Mettler, IDEM(via email)
Randy Braun, IDEM (via email)
Jason Randolph, IDEM (via email)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

MAY 18 2016

REPLY TO THE ATTENTION OF:

WW-16J

RECEIVED

JUN 03 2016

BY _____

Ms. Lee Anne Devine
Chief, Regulatory Branch
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Proposed Seven Hills Mine, Warrick County, Indiana, LRL-2013-635-GJD

Dear Ms. Devine:

This letter is in response to the letter sent to Robert Kaplan, Acting Regional Administrator, from Mr. George DeLancey of your staff on May 11, 2016. Mr. DeLancey requested that the U.S. Environmental Protection Agency provide the U.S. Army Corps of Engineers (Corps) with information to support the 3(b) letter EPA submitted to the Corps on May 10, 2016.

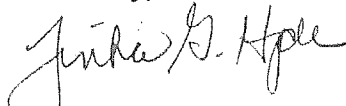
The 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army defines a process and time frames for resolving disputes, in an effort to issue timely permit decisions. Following the process in the MOA, EPA sent the Corps a 3(a) letter on April 14, 2016, within the public comment timeframe. Following the outline of the MOA, within 25 days of the end of the public comment period, the EPA may issue a letter stating that the project will have substantial and unacceptable impacts to an aquatic resource of national importance. EPA did not receive a response from the Corps to our April 14, 2016 letter, or any additional information on the proposed Seven Hills Mine, and subsequently submitted the 3(b) letter on May 10, 2016.

EPA has previously provided information to the Corps supporting the 3(b) determination for the proposed Seven Hills Mine. As Mr. DeLancey noted in his letter, EPA attached detailed comments to the April 14, 2016 letter. Those comments are the culmination of EPA's extensive and thorough review of the proposed project going back to 2013. The comments are based on the application materials, specific onsite resources, proposed impacts, site visits and initial water quality modeling conducted by EPA.

EPA's input and detailed comments throughout the pre-application process, the joint EPA and U.S. Fish and Wildlife Service letter of March 17, 2016, and EPA's April 14, 2016 3(a) letter and attachments, are the basis for EPA's May 10, 2016 3(b) letter and support EPA's opinion on: 1) why there will be substantial and unacceptable impacts to aquatic resources of national importance: Pigeon Creek, its floodplain forested wetlands and the Ohio River; 2) why the specific permit must be denied as proposed to protect aquatic resources of national importance; and 3) how our determination was made. The letters are enclosed.

Please contact Wendy Melgin at (312) 886-7745, if your staff requires additional explanation of EPA's position. We look forward to continuing our coordination with you and the Fish and Wildlife Service on this project.

Sincerely,



Tinka G. Hyde
Director, Water Division

Enclosures

March 17, 2016 USEPA and FWS Letter (w/attachments)

April 14, 2016 USEPA 404 Comment Letter (w/attachments)

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAY 10 2016

REPLY TO THE ATTENTION OF:

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

Dear Colonel Beck:

On April 14, 2016, the U.S. Environmental Protection Agency reviewed and commented on the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warren County, Indiana.

The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service. As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

In the April 14, 2016 letter, the EPA indicated that the proposed project may result in substantial and unacceptable impacts to aquatic resources of national importance (ARNI) in accordance with Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

No additional information has been provided that addresses EPA's concerns. Therefore, pursuant to Part IV, paragraph 3(b) of the August 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army regarding section 404(q) of the CWA, EPA finds that this project, as proposed, will have substantial and unacceptable impacts to aquatic resources of national importance.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

APR 14 2016

REPLY TO THE ATTENTION OF:

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

Subject: Comments on Public Notice LRL-2013-638-GJD; Proposed Seven Hills Mine,
 Warrick County, Indiana.

Dear Colonel Beck:

The U.S. Environmental Protection Agency has reviewed the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service (FWS) (Enclosure 1). As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

Based on our review of the previous and currently available information, and pursuant to Part IV, paragraph 3(a) of the 1992 CWA Section 404(q) Memorandum of Agreement between the EPA and Department of the Army, the EPA is hereby notifying the U.S. Army Corps of Engineers (Corps) that this project may have substantial and unacceptable impacts on aquatic resources of national importance.

The proposed Seven Hills project would mine through over 460 acres of floodplain forested wetlands and 10 miles of streams tributary to Pigeon Creek. From its headwaters, Pigeon Creek flows approximately 50 miles through the project area and bisects downtown Evansville, before joining the Ohio River. The EPA considers Pigeon Creek, its floodplain forested wetlands, and the Ohio River to be aquatic resources of national importance. Project area aquatic resources consist of contiguous tracts of increasingly rare floodplain forested wetlands. These wetlands are diverse and productive systems that are located on floodplains and inundated by flood waters. The Pigeon Creek floodplain forested wetlands filter nutrients, excess sediments and other



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

Re: United Minerals Company, LLC-Seven Hills Mine LRL-2013-635-GJD

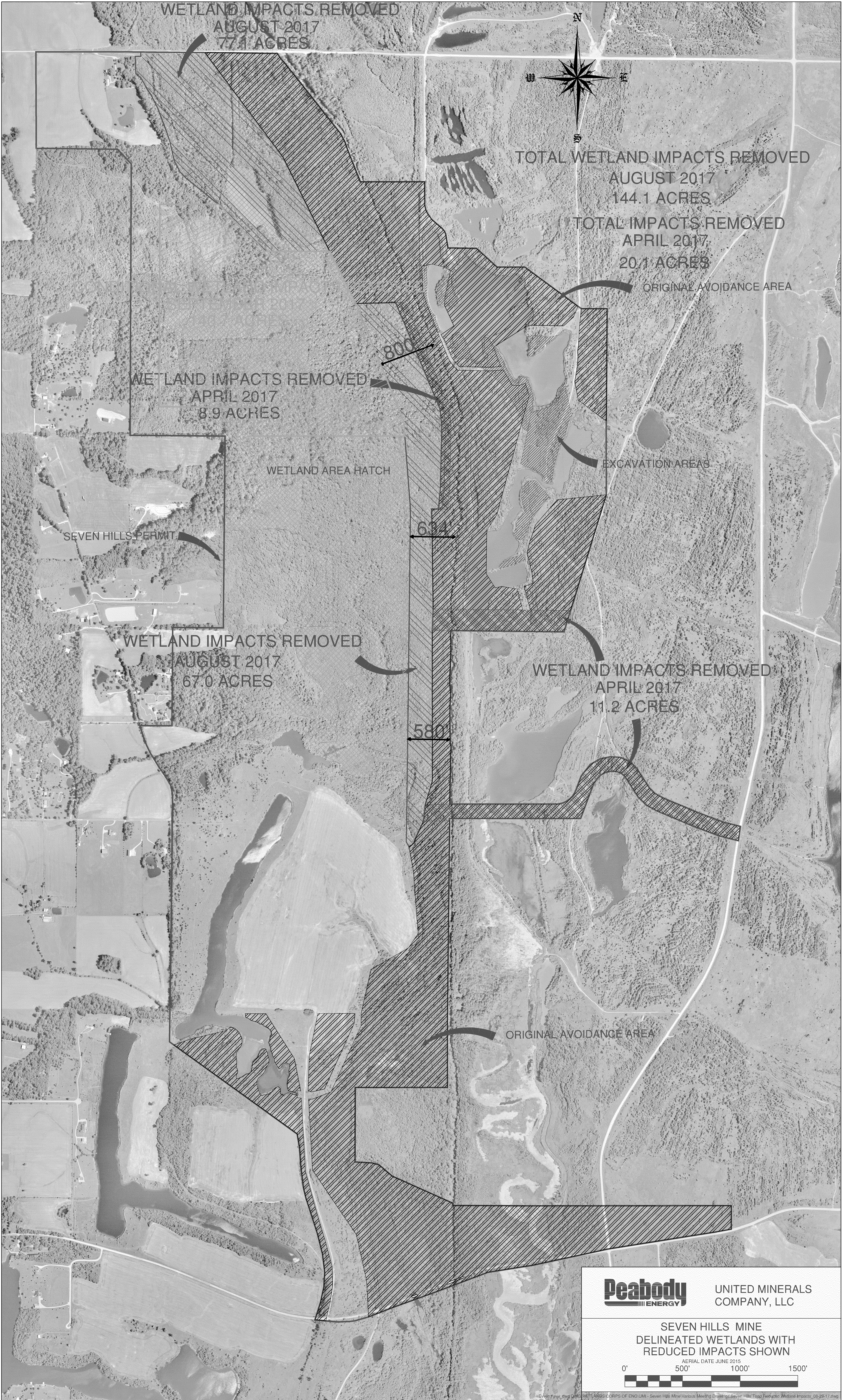
Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and





United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

RE: Modification to Pending Permit Application No. LRL-2013-635-gjd

Dear Colonel Gant:

Previously, we proposed a revised mine plan which significantly reduces wetland impacts at the proposed Seven Hills mine site. This plan includes removing 162 acres of wetlands and 9,445 linear feet from the planned impact area and only requesting "Conditional" approval for future impacts to 140 acres of wetlands and 10,617 linear feet of ephemeral and intermittent streams. Our proposal is for approval to conduct mining operations in the initial area. This will allow Peabody, the Corps and the Indiana Department of Natural Resources (INDNR) to monitor the on-site and off-site mitigation efforts and whether or not significant secondary impacts to the adjacent wetlands are occurring. As you are aware, Peabody has provided engineering and environmental analysis and numerous past mining examples that indicate adjacent negative impacts are not expected; however, if the indirect impacts are significant and/or the mitigation is not being completed as the permit requires the permit "Condition" is not met. As a result, Peabody would not be allowed to continue mining into the 140 acres of wetlands depicted on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and mining is allowed to continue through the "Conditional" 140 acre wetland area. Peabody will also work with the Corps to develop an effective Adaptive Management Plan (AMP) to outline monitoring and any needed corrective actions.

This modification directly responds to concerns raised by the Corps, USEPA and the U.S. Fish and Wildlife Service including:

- Increasing the undisturbed buffer along the west side of Pigeon Creek. The original plan included a minimum buffer width of approximately 110 feet, which is a typical setback distance from a perennial stream. The minimum buffer width will now be 580 feet. While Pigeon Creek is a straightened, dredged and actively eroding channel, the nearly fivefold increase in buffer width will provide additional protection between the mining area and stream and significant travel and habitat areas for potential wildlife and aquatic species including the Indiana Bat and Copperbelly Water snake. Along with the approved Protection and Enhancement Plans (PEPs) included in the approved Surface Mining

Control and Reclamation Act (SMCRA) permit , this plan modification will provide even greater protections to any species of concern.

- The overall footprint of the mining operation has been decreased. It was mentioned in a meeting with the Louisville District that the project needed to be reduced to a “couple hundred acres” of wetland impacts. It is unclear what this direction is based upon, but it does make the initial wetland impact acreage similar to wet land impacts approved through Environmental Assessments and mitigated FONSIs at Bear Run (235 acres of wetland impacts) and Wild Boar (145 acres of wetland impacts). This modification achieves the balance of minimizing the impact while allowing production of an important and valuable energy resource. Unfortunately, the reduced impact area results in an additional 3 million tons of high quality coal remaining in the ground . Nevertheless, a safe and efficient mine can still occur, albeit at a reduced annual production rate.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Wetland Quality

Given you only recently assumed command over the Louisville District, the following summary of the wetland characteristics of the planned impact site are provided to refute incorrect claims of the wetlands being special and unique.

- There are no special or unique trees. In fact, the tree species are typical of southwestern Indiana forested wetlands, according to a review by a professional forester. Logging has occurred on multiple occasions. Please note many of the tree species present on the site are not allowed to be planted for mitigation purposes in the Louisville District, due to the less desirable non-hardwood species.
- Nearly 80% of the wetlands planned for impacts were previously farmed with conventional agricultural methods. The wetlands developed by simply ceasing to farm over time, likely due to increasing beaver activity.

- There is infrequent overbank flooding (3 -7 days per year on average) into the wetlands from Pigeon Creek. In addition, the channel connections from the wetlands into Pigeon Creek are actively eroding and head cutting further into the wetlands.
- The modified plan results in impacts to only 2.1% of the wetlands in the Highland – Pigeon Watershed. The Seven Hills wetlands are not a significant portion of the wetlands in the watershed and the wetland acreages will increase with the additional mitigation proposed in this plan.
- Pigeon Creek is a straightened, eroding, low quality stream. Aquatic life sampling indicates values are rated “fair”. This is similar to what is found in agricultural areas in southern Indiana
- The Hydrogeomorphic (HGM) analysis shows the wetlands can be fully mitigated with an approximate 2:1 mitigation ratio. HGM does not indicate the Seven Hills wetlands are special or unique, it is only a relative measure compared to wetlands in western Kentucky that were used as a reference. Again, these wetlands mostly developed by ceasing farming activities. If a special and unique wetland is present in the area, the Patoka River wetlands located approximately 15 miles north of Seven Hills may be an example. This multi-thousand acre wetland complex is diverse and much more valuable than the Seven Hills wetlands.

Mitigation

Peabody is proposing on-site mitigation/minimization at a ratio of 1:1, off-site mitigation at a ratio of 1.5:1 and many additional enhancements which are quantified in the table below. The Greathouse Island property located adjacent to the Wabash River was previously proposed for mitigation; however, the surprisingly low credit values the Corps was willing to grant for this property caused Peabody to drop the option it had to purchase this property. The option was held for 5 years and nearly \$400,000 was invested on what was and is still believed to be a very high potential mitigation property. We have recently requested guidance on mitigation credits for properties within the Highland -Pigeon watershed and in adjacent watersheds, yet the Louisville District has not provided any clear guidance on the potential mitigation value for these properties. The acquisition of such properties is time consuming and there are other entities competing to acquire these properties. The inability to gain a clear understanding of the mitigation value that the Corps will grant puts Peabody in a competitive disadvantage and leads to missed opportunities and wasted time and resources. This is especially frustrating and confusing, when the Louisville District suggested earlier this year, that we contact the Patoka National Wildlife Refuge manager about potential mitigation properties in the Refuge target area that would be desirable mitigation properties for Seven Hills. Further, site visits were made with Louisville District personnel and favorable verbal opinions were given on the value of one property that Peabody has the potential to

acquire. Peabody renews its request to obtain clear guidance on potential mitigation values of properties that it brings forward, so it has a fair opportunity to obtain these properties and not waste valuable time and resources similar to the Greathouse Island example.

Considering the reluctance to engage on specific mitigation, Peabody is proposing the following conceptual mitigation plan. This plan can be finalized with site specific data following agreement on the requirement and appropriate feedback on mitigation values of proposed properties.

- Peabody will provide a 2.5:1 wetland mitigation ratio consisting of 1:1 acres on-site and 1.5:1 acres off-site. The HGM process which the Corps and EPA requested Peabody to use in the spring of this year, indicates an approximate 2: 1 mitigation ratio fully mitigates the planned site impacts. This is consistent with the HGM assessment completed at this site initially in 2007. The HGM process has not been utilized previously for other Peabody permits in the Louisville District and it appears to provide a much better and transparent method of calculating wetland mitigation needs than the ambiguous methods employed in the past.
 - Regarding the off-site mitigation, Peabody commits to providing 1:1 acreage in the Highland – Pigeon watershed. At a minimum, this will fully mitigate the site impacts in the same watershed. When other mitigation enhancements are considered as described below, the actual mitigation ratio is increased further. It is important to note the off-site mitigation will not only create additional wetlands, but it will also reduce conventional agriculture activities as this acreage will consist of converting current croplands to wetlands.
 - Peabody will provide approximately 0.5:1 mitigation in the Highland – Pigeon or adjacent watersheds. Please note the adjacent watersheds in southwest Indiana are very similar in watershed impacts and needed improvements as there is a prevalence of conventional agricultural activities occurring in the region.
 - Peabody will complete the mitigation as a mix of forested, scrub/shrub and emergent wetlands in a manner representative of the impact site or complete all of the mitigation as a forested wetland. Forested wetlands have been considered to be of higher value by the Louisville District to date.
 - Peabody will utilize high value hardwood tree species on both the on-site and off-site mitigation areas. Please note the Louisville District has not allowed Peabody to plant many of the existing tree species currently present at the site.
 - Peabody will add intentional diversity (pools, roughness, etc.) into the topography to enhance the site.

- Peabody will lower elevations of previously reclaimed areas on the east side of Pigeon Creek to create additional wetlands that will receive more overbank flow from Pigeon Creek and provide additional flood storage and flood water treatment. This issue was deemed very important to the US Fish and Wildlife Service and also serves to create additional habitat for many local species. Please note this work will be completed in advance of mining operations as part of the work is also needed for the flood control purposes during mining. This area will remain in its current state and the floodplain will not be expanded if the mining project is not allowed.
- Peabody will repair existing drainages and install appropriate stabilizing and habitat enhancing structures in the avoidance areas between the mining area and Pigeon Creek. These drainages are currently actively eroding and head cutting through the wetlands. If this project does not move forward, these drainages will continue eroding and will degrade the wetlands over time. Peabody will also restore impacted intermittent drainages at a 1:1 mitigation ratio with appropriate natural stream construction enhancements.
- At the completion of mining, Peabody will remove the “levee” along the west side of Pigeon Creek in strategic locations to improve the connectivity and over bank flooding of the creek into the wetlands. If the mining project does not occur, this improvement will not occur.
- Peabody will incorporate Copperbelly watersnake (CWS) habitat into its mitigation plan along Pigeon Creek to address U.S. Fish and Wildlife Service concerns. These efforts have proven to be successful at previous mining locations, including the Columbia Mine which has been added to the Patoka National Wildlife Refuge. Also, please note one of the recent potential mitigation properties submitted to the Corps for a mitigation value determination is in the Patoka River watershed and within the Refuge target acquisition area and is considered Core Habitat for the CWS. The Refuge has been unable to acquire this property; however, the property could be acquired and used as mitigation for this property, if the mitigation values were known and valued correctly.
- Peabody will conduct upstream and downstream sampling for Nutrients before, during and after mining. No impacts are expected regarding Nutrients; however, the sampling can confirm this and will address a concern from U.S. EPA.
- Peabody will place a Conservation Easement on a 20 acre forested wetland in the Pigeon Creek watershed, located approximately 3 miles south of the mining area. An Indiana Bat roost tree was identified on this tract in a 2008 Indiana Bat survey and the tract contains numerous trees with sloughing bark which is ideal roost tree habitat. This tract is currently not included in a permit and not subject to the Protection and Enhancement Plans (PEPs); therefore, timber cutting could occur at any time. Peabody intentionally acquired this

property for this purpose and will likely sell it, if appropriate credit is not given. This area will be protected in perpetuity if the mining project occurs.

- As mentioned previously, a minimum buffer width of 580 feet will be in place between the mining area and Pigeon Creek. The buffer is up to 800 feet wide in some stretches. This area will be protected with a conservation easement that will prevent future timber cutting. This protection will not be in place if the mining project is not approved.
- Peabody owns additional properties in the Pigeon Creek corridor which it is willing to consider site protection instruments on if appropriate mitigation credit is provided.

Given the direct mitigation acreage and enhancements listed above, Peabody believes the wetland mitigation value for the initial 207 acres of wetland impacts is outlined in the table below.

Mitigation Activity	Acreage	Mitigation Credit Factor	Total Credit
On-site mitigation	207	1	207
On-site Protection	207	0.2	41
Off-site mitigation	311	1	311
Off-site Protection	311	0.15	47
Removal of active cropland by conversion to wetlands	311	0.1	31
Preferred hardwood tree species	518	0.05	26
Stabilize and repair drainages, remove levee and add CWS habitat in avoidance/buffer area	219	0.1	22
Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

This project is very important to Peabody's Midwest operations and workforce and we are hopeful that any remaining issues can be resolved promptly. Upon agreement of the plan modification, Peabody will move forward to revise all applicable parts of the application. If you have any questions or comments, I can be reached by email at Bwest@peabodyenergy.com or at 812-455-278.

Sincerely,

Bryce West
Vice President Environmental Services

Enclosures

Seven Hills Coal Mine Application

Additional Information Request

- Purpose in this request for additional information
 - Did not provide earlier
 - Needed for legally defensible path forward
 - This is not all that is needed but what has been determined thus far

- Identifying all impacts to “waters of the U.S.”
 - Direct Impacts
 - Noted 5/22/17 avoidance specified in email from B. West (3000’ buffer from 120’ to 250’ = 9 acres and also crossings of Pigeon Creek)
 - Mentioned in previous two meetings but please clarify - Prep plant – where is slurry disposal going and how will it get there?
 - Any impacts associated with that?
 - Flood Plain Excavation – PN vs 6/14/17 submittal (K. Rogers)
 - Appears to be additional impacts to “waters” not accounted for in PN associated with the floodplain excavation proposed
 - How are you getting equipment into floodplain excavation areas?
 - Open Water Impacts – appears to be all Jurisdictional Open Waters - 104 acres
 - Have all the impacts associated with the levee construction been determined including equipment disturbing adjacent wetlands during construction?
 - Indirect Impacts
 - HEC-RAS Model – Only have results of model and not the model – would like to see the whole model
 - Flooding/inundating anything that is not currently impacted by existing conditions is an impact
 - Flood easements – 0.14 ft – flooding increasing more than 0.00 is an impact on aquatic and terrestrial habitat
 - I-64 – increases in elevations past I-64 – is INDOT aware?
 - Would like inundation mapping
 - What is being impacted by the increases in elevation - Old works? Other waters? Terrestrial/ Aquatic impact
 - This Year there was a 200 – 500 yr event – should update model to reflect
 - Levee height may need to be increased
 - Velocity Increases
 - Station 126+44 - 3.44-7.27 (ft/s)
 - Sedimentation
 - Additional Erosion
 - Instability
 - Downstream Impacts
 - Wetlands being bisected onsite by levees or other activities – for example - PSS7, PSS2, PFO1, PSS8, PFO3

- Draw down from 200' pit – Need scientific study – seepage analysis
- Impacts on Pigeon Cr – need cut-off wall – could “drain” Pigeon Cr
 - Corps does not allow pits on landward side of levees
 - Mentioned in 9 June email K. Rogers attachment – “We don’t expect a blanket of sand based on the soils and the borings from the site. This doesn’t mean that there wouldn’t be small discontinuous layers of sand sparsely present.”
- Riverward side/ West Bank of Levee – increased velocities and inundation
- High Pt Potential Mining – butts up to avoided areas – any impacts to avoided areas from this proposal?
- Levee Construction – Corps would expect -
 - Key way 6’ deep entire width; 95% compaction; ASTM D 698 cohesive soils; 8” lifts; biodegradable geotextile fabric
 - Pipe through levee – Critical issue – need special construction methods and construction experts for this type of activity
 - Height of levee – 1 foot of freeboard
 - In SMCRA application – indication that there is a 25 foot wide open channel – primary spillway - from sediment basins cutting through the levees to the river.
- Operational Questions and concerns that may result in identifying additional impacts
 - Material disposal in lakes – how are you doing that – just pushing? Scooping and dumping ...?
 - Levee construction
 - Are you removing the levee keyway when you remove the levees?
 - How do you get equipment into Phase III and IV?
 - Also HEC-RAS model indicates Phase I & II are removed before Phase III and Phase III is removed before Phase IV; Need to ensure HEC-RAS model is designed to model this plan correctly
 - Removal levee and potential erosion from increases in velocities and destabilization as remove Phase I and II levees and then Phase III levee

Once all the Direct and Indirect Impacts are determined, then the Alternatives analysis can begin – We need to know all the impacts before we can “compare.”

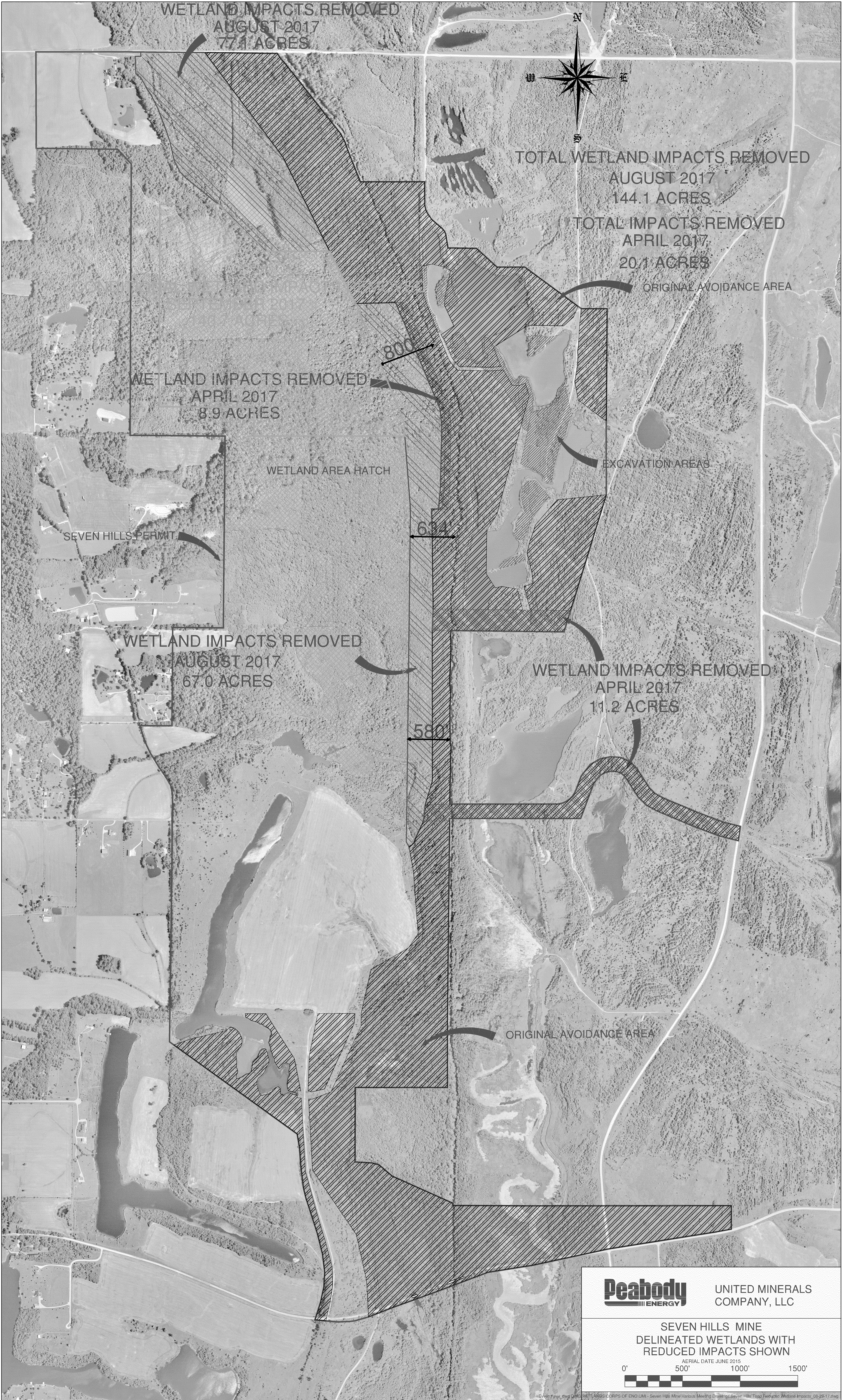
- LEDPA – Once we determine total impacts – both direct and indirect – can do a LEDPA analysis
 - We have not “agreed” on the Project purpose
 - Basic Project Purpose – Mine Coal – Non-water dependent activity – In accordance with 404b1 Guidelines - Presume that there are alternatives that do not involve impacts to special aquatic sites – 510 acres of wetlands.
 - Defining Overall Project Purpose is the responsibility of the Corps – however, the applicant’s needs must be considered in the context of the desired geographic area and the type of project being proposed
 - Mine Coal in the Illinois Basin? State of Indiana? Pigeon Cr watershed?
 - Larger the Impact the more robust the analysis should be – 40 CFR 230.10 “the compliance evaluation procedures will vary to reflect the seriousness of the potential


for adverse impacts on the aquatic ecosystems posed by specific dredge or fill material discharge activities.”

- Does not always mean best economic benefit for the applicant
- Mitigation –
 - Since 1 July 2007 authorized impacts to 1,743,046 ft of stream (321.9 miles); 506.6 acres of wetland impacts and 1367 acres of open water impact to Peabody and its subsidiaries; Mitigation released so far 30 acres of off-site wetland mitigation.
 - Did not spend much time reviewing proposed mitigation – we are not there.
 - Cross-section/swell – “fluff” – reclamation plan map 30’ – 40’ higher than currently
 - Discussion on swell of spoil material
- Cumulative Impacts
 - More thorough Cumulative Analysis is required for 8 digit HUC
 - 2012 – 2014 – 3 yrs of data for the entire country – related to coal mining authorizations
 - Total wetland impacts – 1017 acres
 - Broken down by state – not one state for the 3 year period total is equal to or greater than the proposed 510 acre impact
 - Most in any county in the country for that total 3 year period is 147.5 acres
 - Warrick County, IN was fourth on the list at 105.8 acres.
 - Stream impacts – Indiana had more authorized stream impacts then anywhere in the country – almost twice as many stream impacts as the next closest State – Texas
 - Add IL Basin stream impact numbers and it is more than half of the impacts in the entire country
 - 2007 – 2017 IL Basin
 - Total wetland impact – 1196 acres – Peabody 507 acres
 - Streams 3,769,00 – Peabody 1, 743,000 lft
 - 14 June 2017 letter from Baker McKenzie – “UMC intends to develop all of its available reserves” – reasonable foreseeable impacts

I did not discuss this last item at the meeting because I was under the impression that you all were working on it already based on the letter we received from you all dated June 14, 2017. This is re-written slightly to better explain the request. Also this is more than what is requested above with regard to direct and indirect impacts to "waters of the U.S."


Provide a robust assessment of the direct and indirect impacts to aquatic, avian, and terrestrial species that utilize the site in supporting various aspects of their life cycle. This may include, but is not necessarily limited to nursery refuge, habitat, and food web support. A more comprehensive discussion/inventory is needed on what species are present on the site, both listed species (federal and state) and not listed species, whether they are present permanently or utilize the site temporarily. How would the mining affect these communities locally and further off-site?





UNITED MINERALS
COMPANY, LLC

SEVEN HILLS MINE
DELINEATED WETLANDS WITH
REDUCED IMPACTS SHOWN
AERIAL DATE JUNE 2015

0'500'1000'1500'

\\Even-Plex-Dwg-DWG\WETLANDS\CORPS OF ENG\UMI - Seven Hills Mine\Various Meeting Drawings\Seven Hills Topog Reduced Wetland Impacts_08-29-17.dwg



United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

RE: Modification to Pending Permit Application No. LRL-2013-635-gjd

Dear Colonel Gant:

Previously, we proposed a revised mine plan which significantly reduces wetland impacts at the proposed Seven Hills mine site. This plan includes removing 162 acres of wetlands and 9,445 linear feet from the planned impact area and only requesting "Conditional" approval for future impacts to 140 acres of wetlands and 10,617 linear feet of ephemeral and intermittent streams. Our proposal is for approval to conduct mining operations in the initial area. This will allow Peabody, the Corps and the Indiana Department of Natural Resources (INDNR) to monitor the on-site and off-site mitigation efforts and whether or not significant secondary impacts to the adjacent wetlands are occurring. As you are aware, Peabody has provided engineering and environmental analysis and numerous past mining examples that indicate adjacent negative impacts are not expected; however, if the indirect impacts are significant and/or the mitigation is not being completed as the permit requires the permit "Condition" is not met. As a result, Peabody would not be allowed to continue mining into the 140 acres of wetlands depicted on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and mining is allowed to continue through the "Conditional" 140 acre wetland area. Peabody will also work with the Corps to develop an effective Adaptive Management Plan (AMP) to outline monitoring and any needed corrective actions.

This modification directly responds to concerns raised by the Corps, USEPA and the U.S. Fish and Wildlife Service including:

- Increasing the undisturbed buffer along the west side of Pigeon Creek. The original plan included a minimum buffer width of approximately 110 feet, which is a typical setback distance from a perennial stream. The minimum buffer width will now be 580 feet. While Pigeon Creek is a straightened, dredged and actively eroding channel, the nearly fivefold increase in buffer width will provide additional protection between the mining area and stream and significant travel and habitat areas for potential wildlife and aquatic species including the Indiana Bat and Copperbelly Water snake. Along with the approved Protection and Enhancement Plans (PEPs) included in the approved Surface Mining

Control and Reclamation Act (SMCRA) permit , this plan modification will provide even greater protections to any species of concern.

- The overall footprint of the mining operation has been decreased. It was mentioned in a meeting with the Louisville District that the project needed to be reduced to a “couple hundred acres” of wetland impacts. It is unclear what this direction is based upon, but it does make the initial wetland impact acreage similar to wet land impacts approved through Environmental Assessments and mitigated FONSIs at Bear Run (235 acres of wetland impacts) and Wild Boar (145 acres of wetland impacts). This modification achieves the balance of minimizing the impact while allowing production of an important and valuable energy resource. Unfortunately, the reduced impact area results in an additional 3 million tons of high quality coal remaining in the ground . Nevertheless, a safe and efficient mine can still occur, albeit at a reduced annual production rate.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
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“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Wetland Quality

Given you only recently assumed command over the Louisville District, the following summary of the wetland characteristics of the planned impact site are provided to refute incorrect claims of the wetlands being special and unique.

- There are no special or unique trees. In fact, the tree species are typical of southwestern Indiana forested wetlands, according to a review by a professional forester. Logging has occurred on multiple occasions. Please note many of the tree species present on the site are not allowed to be planted for mitigation purposes in the Louisville District, due to the less desirable non-hardwood species.
- Nearly 80% of the wetlands planned for impacts were previously farmed with conventional agricultural methods. The wetlands developed by simply ceasing to farm over time, likely due to increasing beaver activity.

- There is infrequent overbank flooding (3 -7 days per year on average) into the wetlands from Pigeon Creek. In addition, the channel connections from the wetlands into Pigeon Creek are actively eroding and head cutting further into the wetlands.
- The modified plan results in impacts to only 2.1% of the wetlands in the Highland – Pigeon Watershed. The Seven Hills wetlands are not a significant portion of the wetlands in the watershed and the wetland acreages will increase with the additional mitigation proposed in this plan.
- Pigeon Creek is a straightened, eroding, low quality stream. Aquatic life sampling indicates values are rated “fair”. This is similar to what is found in agricultural areas in southern Indiana
- The Hydrogeomorphic (HGM) analysis shows the wetlands can be fully mitigated with an approximate 2:1 mitigation ratio. HGM does not indicate the Seven Hills wetlands are special or unique, it is only a relative measure compared to wetlands in western Kentucky that were used as a reference. Again, these wetlands mostly developed by ceasing farming activities. If a special and unique wetland is present in the area, the Patoka River wetlands located approximately 15 miles north of Seven Hills may be an example. This multi-thousand acre wetland complex is diverse and much more valuable than the Seven Hills wetlands.

Mitigation

Peabody is proposing on-site mitigation/minimization at a ratio of 1:1, off-site mitigation at a ratio of 1.5:1 and many additional enhancements which are quantified in the table below. The Greathouse Island property located adjacent to the Wabash River was previously proposed for mitigation; however, the surprisingly low credit values the Corps was willing to grant for this property caused Peabody to drop the option it had to purchase this property. The option was held for 5 years and nearly \$400,000 was invested on what was and is still believed to be a very high potential mitigation property. We have recently requested guidance on mitigation credits for properties within the Highland -Pigeon watershed and in adjacent watersheds, yet the Louisville District has not provided any clear guidance on the potential mitigation value for these properties. The acquisition of such properties is time consuming and there are other entities competing to acquire these properties. The inability to gain a clear understanding of the mitigation value that the Corps will grant puts Peabody in a competitive disadvantage and leads to missed opportunities and wasted time and resources. This is especially frustrating and confusing, when the Louisville District suggested earlier this year, that we contact the Patoka National Wildlife Refuge manager about potential mitigation properties in the Refuge target area that would be desirable mitigation properties for Seven Hills. Further, site visits were made with Louisville District personnel and favorable verbal opinions were given on the value of one property that Peabody has the potential to

acquire. Peabody renews its request to obtain clear guidance on potential mitigation values of properties that it brings forward, so it has a fair opportunity to obtain these properties and not waste valuable time and resources similar to the Greathouse Island example.

Considering the reluctance to engage on specific mitigation, Peabody is proposing the following conceptual mitigation plan. This plan can be finalized with site specific data following agreement on the requirement and appropriate feedback on mitigation values of proposed properties.

- Peabody will provide a 2.5:1 wetland mitigation ratio consisting of 1:1 acres on-site and 1.5:1 acres off-site. The HGM process which the Corps and EPA requested Peabody to use in the spring of this year, indicates an approximate 2:1 mitigation ratio fully mitigates the planned site impacts. This is consistent with the HGM assessment completed at this site initially in 2007. The HGM process has not been utilized previously for other Peabody permits in the Louisville District and it appears to provide a much better and transparent method of calculating wetland mitigation needs than the ambiguous methods employed in the past.
 - Regarding the off-site mitigation, Peabody commits to providing 1:1 acreage in the Highland – Pigeon watershed. At a minimum, this will fully mitigate the site impacts in the same watershed. When other mitigation enhancements are considered as described below, the actual mitigation ratio is increased further. It is important to note the off-site mitigation will not only create additional wetlands, but it will also reduce conventional agriculture activities as this acreage will consist of converting current croplands to wetlands.
 - Peabody will provide approximately 0.5:1 mitigation in the Highland – Pigeon or adjacent watersheds. Please note the adjacent watersheds in southwest Indiana are very similar in watershed impacts and needed improvements as there is a prevalence of conventional agricultural activities occurring in the region.
 - Peabody will complete the mitigation as a mix of forested, scrub/shrub and emergent wetlands in a manner representative of the impact site or complete all of the mitigation as a forested wetland. Forested wetlands have been considered to be of higher value by the Louisville District to date.
 - Peabody will utilize high value hardwood tree species on both the on-site and off-site mitigation areas. Please note the Louisville District has not allowed Peabody to plant many of the existing tree species currently present at the site.
 - Peabody will add intentional diversity (pools, roughness, etc.) into the topography to enhance the site.

- Peabody will lower elevations of previously reclaimed areas on the east side of Pigeon Creek to create additional wetlands that will receive more overbank flow from Pigeon Creek and provide additional flood storage and flood water treatment. This issue was deemed very important to the US Fish and Wildlife Service and also serves to create additional habitat for many local species. Please note this work will be completed in advance of mining operations as part of the work is also needed for the flood control purposes during mining. This area will remain in its current state and the floodplain will not be expanded if the mining project is not allowed.
- Peabody will repair existing drainages and install appropriate stabilizing and habitat enhancing structures in the avoidance areas between the mining area and Pigeon Creek. These drainages are currently actively eroding and head cutting through the wetlands. If this project does not move forward, these drainages will continue eroding and will degrade the wetlands over time. Peabody will also restore impacted intermittent drainages at a 1:1 mitigation ratio with appropriate natural stream construction enhancements.
- At the completion of mining, Peabody will remove the “levee” along the west side of Pigeon Creek in strategic locations to improve the connectivity and over bank flooding of the creek into the wetlands. If the mining project does not occur, this improvement will not occur.
- Peabody will incorporate Copperbelly watersnake (CWS) habitat into its mitigation plan along Pigeon Creek to address U.S. Fish and Wildlife Service concerns. These efforts have proven to be successful at previous mining locations, including the Columbia Mine which has been added to the Patoka National Wildlife Refuge. Also, please note one of the recent potential mitigation properties submitted to the Corps for a mitigation value determination is in the Patoka River watershed and within the Refuge target acquisition area and is considered Core Habitat for the CWS. The Refuge has been unable to acquire this property; however, the property could be acquired and used as mitigation for this property, if the mitigation values were known and valued correctly.
- Peabody will conduct upstream and downstream sampling for Nutrients before, during and after mining. No impacts are expected regarding Nutrients; however, the sampling can confirm this and will address a concern from U.S. EPA.
- Peabody will place a Conservation Easement on a 20 acre forested wetland in the Pigeon Creek watershed, located approximately 3 miles south of the mining area. An Indiana Bat roost tree was identified on this tract in a 2008 Indiana Bat survey and the tract contains numerous trees with sloughing bark which is ideal roost tree habitat. This tract is currently not included in a permit and not subject to the Protection and Enhancement Plans (PEPs); therefore, timber cutting could occur at any time. Peabody intentionally acquired this

property for this purpose and will likely sell it, if appropriate credit is not given. This area will be protected in perpetuity if the mining project occurs.

- As mentioned previously, a minimum buffer width of 580 feet will be in place between the mining area and Pigeon Creek. The buffer is up to 800 feet wide in some stretches. This area will be protected with a conservation easement that will prevent future timber cutting. This protection will not be in place if the mining project is not approved.
- Peabody owns additional properties in the Pigeon Creek corridor which it is willing to consider site protection instruments on if appropriate mitigation credit is provided.

Given the direct mitigation acreage and enhancements listed above, Peabody believes the wetland mitigation value for the initial 207 acres of wetland impacts is outlined in the table below.

Mitigation Activity	Acreage	Mitigation Credit Factor	Total Credit
On-site mitigation	207	1	207
On-site Protection	207	0.2	41
Off-site mitigation	311	1	311
Off-site Protection	311	0.15	47
Removal of active cropland by conversion to wetlands	311	0.1	31
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Stabilize and repair drainages, remove levee and add CWS habitat in avoidance/buffer area	219	0.1	22
Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

This project is very important to Peabody's Midwest operations and workforce and we are hopeful that any remaining issues can be resolved promptly. Upon agreement of the plan modification, Peabody will move forward to revise all applicable parts of the application. If you have any questions or comments, I can be reached by email at Bwest@peabodyenergy.com or at 812-455-278.

Sincerely,

Bryce West
Vice President Environmental Services

Enclosures



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGIONAL ADMINISTRATOR
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAR 05 2018

Colonel Antoinette R. Gant
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

SUBJECT: Modification to Pending Permit Application No. LRL-2013-635-gjd — Seven Hills Mine

Dear Colonel Gant:

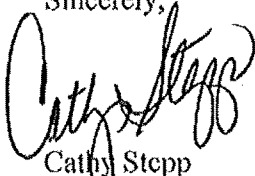
As the newly appointed Regional Administrator for Region 5 of the U.S. Environmental Protection Agency (EPA or Agency), I am writing to you regarding the proposed Seven Hills surface coal mine. A subsidiary of Peabody Energy had previously applied for a Clean Water Act section 404 permit from the U.S. Army Corps of Engineers for the proposed mine to be located in Warrick County, Indiana. I understand the site is already approved under the Surface Mining Control and Reclamation Act. During the last several years, EPA Region 5 has appreciated the opportunity to work with the Louisville District, along with the U.S. Fish and Wildlife Service, to evaluate the potential environmental impacts of this proposed project. In 2016, EPA Region 5 advised the Louisville District about potential impacts to aquatic resources posed by the project as then planned, especially to aquatic resources, and that further coordination between EPA Headquarters and the Department of the Army was warranted.

It is my understanding that over the past year the project sponsor has met with EPA, the Army Corps, and the Fish and Wildlife Service on numerous occasions to discuss the project and late last year submitted a revised project plan to the Army Corps. Based on a preliminary review by EPA staff, it appears the revised plan incorporates a number of changes to reduce the direct impacts on wetlands that were previously discussed.

I appreciate the roles our respective agencies play in ensuring that environmental impacts from projects such as this are properly evaluated consistent with our authorities under the Clean Water Act, and I look forward to continuing our work together in the future. At this time, I do not plan to seek further EPA Headquarters and Department of the Army coordination on the proposed project. As the Army Corps continues its review of the potential environmental impacts of the revised project plan, EPA Region 5 would happy to provide any assistance that the Army Corps may request as it makes any necessary determinations

under Clean Water Act section 404 or the National Environmental Policy Act. Please feel free to contact me with any questions you may have regarding this permit.

Sincerely,

A handwritten signature in black ink, appearing to read "Cathy Stepp". The signature is fluid and cursive, with the first name "Cathy" and last name "Stepp" clearly distinguishable.

Cathy Stepp
Regional Administrator



United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

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Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

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Sincerely,

Bryce West
Vice President Environmental Services

Enclosures

To: Eric Fry[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Wed 1/3/2018 10:25:48 PM
Subject: Re: 7 Hills

Thanks Eric.

Gregory E. Peck
Chief of Staff
Office of Water
U.S. Environmental Protection Agency
Washington D.C. 20460

(202) 564-5778

On Jan 3, 2018, at 5:14 PM, Eric Fry <ericfryllc@yahoo.com> wrote:

FYI

Sent from my iPhone

Begin forwarded message:

From: "West, Bryce" <BWest@peabodyenergy.com>
Date: January 3, 2018 at 4:00:16 PM CST
To: "Eric Fry (ericfryllc@yahoo.com)" <ericfryllc@yahoo.com>
Subject: 7 Hills

Here is the summary of impacts and avoidance for total wetlands, forested wetlands only and streams.

Thanks

Bryce West

Peabody Energy

314-588-2784 (office STL)

812-455-8278 (cell)

bwest@peabodyenergy.com

E-mail Disclaimer:

The information contained in this e-mail, and in any accompanying documents, may constitute confidential and/or legally privileged information. The information is intended only for use by the designated recipient. If you are not the intended recipient (or responsible for the delivery of the message to the intended recipient), you are hereby notified that any dissemination, distribution, copying, or other use of, or taking of any action in reliance on this e-mail is strictly prohibited. If you have received this email communication in error, please notify the sender immediately and delete the message from your system.

<Avoidance and Impact table 010318.pdf>

To: eric fry[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Tue 3/6/2018 4:47:07 PM
Subject: Letter is signed

I don't have a copy yet.

Gregory E. Peck

Chief of Staff

Office of Water

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue

Washington, D.C. 20460

202-564-5700

To: eric fry[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Tue 9/19/2017 9:22:13 PM
Subject: Re: Aquatic study

Thanks.

Gregory E. Peck
 Chief of Staff
 Office of Water
 U.S. Environmental Protection Agency
 Washington D.C. 20460

(202) 564-5778

On Sep 19, 2017, at 4:32 PM, eric fry <ericfryllc@yahoo.com> wrote:

fyi

----- Forwarded Message -----

From: West, Bryce <BWWest@peabodyenergy.com>
To: Eric Fry (ericfryllc@yahoo.com) <ericfryllc@yahoo.com>
Sent: Tuesday, September 19, 2017, 2:59:11 PM CDT
Subject: Aquatic study

Eco-Tech is finalizing the update to the Seven Hills Aquatic Assessment Report. Similar to previous findings - low quality. This will be submitted to the Corps in the next day or so. Here is the concluding paragraph.

Ok to forward.

5. CONCLUSION

Streams within the project area display several indicators of disturbance and poor water

quality. They have been subject to channelization and show very little development of

instream habitat and stable substrate. Water quality measurements show significant stressors

to aquatic life in the form of high dissolved solids and low dissolved oxygen. Fish and

macroinvertebrate communities at all sites reflect a very tolerant aquatic

assemblage that is

adapted to low gradient streams with inadequate habitat and water quality issues.

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To: eric fry[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Fri 9/8/2017 7:52:25 PM
Subject: RE: Seven Hills Mine - USEPA Letters

Thank you Eric!

Gregory E. Peck

Chief of Staff

Office of Water

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue

Washington, D.C. 20460

202-564-5700

From: eric fry [mailto:ericfryllc@yahoo.com]
Sent: Friday, September 08, 2017 3:37 PM
To: Peck, Gregory <Peck.Gregory@epa.gov>
Subject: Fw: Seven Hills Mine - USEPA Letters

fyi

Please find attached the USEPA official correspondence that we received during the public notice comment period.

Ann

Ann Nelson, PE | Sr. Engineer | Midwest

566 Dickeyville Road | Lynnvile, IN 47619 | ann_nelson@peabodyenergy.com

Office 812.922.1046 | Fax 812.922.1066



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To: eric fry[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Tue 9/5/2017 4:29:17 PM
Subject: RE: Conditional area

Total avoidance would now be about 250 acres? How does that impact coal recovery?

Gregory E. Peck

Chief of Staff

Office of Water

U.S. Environmental Protection Agency

1200 Pennsylvania Avenue

Washington, D.C. 20460

202-564-5700

To: ericfryllc@yahoo.com[ericfryllc@yahoo.com]
From: Peck, Gregory
Sent: Tue 11/21/2017 10:29:38 PM
Subject: DOI Contacts

*todd_willens@ios.doi.gov

*greg_j_sheehan@fws.gov

*catherine_gulac@ios.doi.gov

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Thur 10/19/2017 6:58:42 PM
Subject: 7h
Seven Hills Modification Summary 101817.docx

fyi

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Thur 8/24/2017 9:06:22 PM
Subject: Seven Hills update
[Seven Hills Topo Reduced Wetland Impacts 08-29-17.pdf](#)

fyi

Peabody is proposing to significantly reduce the wetland impacts to 7 hills in hopes of moving this project forward. Attached is the map that Peabody will be sending to Colonel Gant. We have reduced our wetland impacts by 1/3 and increased the buffer along Pigeon Creek by nearly 5 times from our original plan.

Our original permit application for Seven Hills included planned impacts to 510 acres of wetlands. The original plan also included an undisturbed buffer a minimum of 120 feet in width along Pigeon Creek, with the exception of two planned equipment crossings through Pigeon Creek. In April of 2017, we adjusted this plan to remove the two equipment crossings and increase the minimum buffer width along Pigeon Creek to 250 feet. This change reduced the wetland impacts by 20 acres. In an attempt to resolve agency concerns regarding these wetlands impacts in a robust Environmental Assessment, Peabody has revised its mining plan extensively to reduce the wetland impacts by an additional 144 acres. This change results in a minimum undisturbed buffer width along Pigeon Creek of 580 feet. These changes result in a reduced coal tonnage of approximately 3 M tons and also a decrease in the planned annual production rate due to decreased pit length.

Despite its continued belief that an EA is appropriate for the permit as originally submitted, Peabody is making this plan change to accommodate agency concerns over the extent of wetland impacts. This permit is very important to Peabody's Indiana operations in terms of high quality and low ratio to coal to blend with other Operations and extend high paying jobs to its workforce.

We will provide an exceptional mitigation plan once the ACOE is willing to engage with us on this. We hope that, at the very least, EPA will view this is a significant change and that they will communicate with the Corps that our plan can be considered for an EA.

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To: Peck, Gregory[Peck.Gregory@epa.gov]
From: Eric Fry
Sent: Wed 1/3/2018 10:13:19 PM
Subject: Fwd: 7 Hills
Avoidance and Impact table 010318.pdf

FYI

Sent from my iPhone

Begin forwarded message:

From: "West, Bryce" <BWest@peabodyenergy.com>
Date: January 3, 2018 at 4:00:16 PM CST
To: "Eric Fry (ericfryllc@yahoo.com)" <ericfryllc@yahoo.com>
Subject: 7 Hills

Here is the summary of impacts and avoidance for total wetlands, forested wetlands only and streams.

Thanks

Bryce West

Peabody Energy

314-588-2784 (office STL)

812-455-8278 (cell)

bwest@peabodyenergy.com

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To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Fri 8/4/2017 7:15:33 PM
[Seven Hills Coal Mine Application questions.docx](#)

See attached the list of info Lee Anne has requested as of yesterday. Note she says there will be more questions. In a process of 8 years this is the first time we are seeing this information requested. Col Gant wants this resolved in one month. I do not blame Col Gant for the game that is being played here.

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Tue 9/19/2017 8:31:08 PM
Subject: Fw: Aquatic study

fyi

----- Forwarded Message -----

From: West, Bryce <BWest@peabodyenergy.com>
To: Eric Fry (ericfryllc@yahoo.com) <ericfryllc@yahoo.com>
Sent: Tuesday, September 19, 2017, 2:59:11 PM CDT
Subject: Aquatic study

Eco-Tech is finalizing the update to the Seven Hills Aquatic Assessment Report. Similar to previous findings - low quality. This will be submitted to the Corps in the next day or so. Here is the concluding paragraph.

Ok to forward.

5. CONCLUSION

Streams within the project area display several indicators of disturbance and poor water quality. They have been subject to channelization and show very little development of instream habitat and stable substrate. Water quality measurements show significant stressors to aquatic life in the form of high dissolved solids and low dissolved oxygen. Fish and macroinvertebrate communities at all sites reflect a very tolerant aquatic assemblage that is adapted to low gradient streams with inadequate habitat and water quality issues.

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To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Mon 9/11/2017 8:34:56 PM
Subject: 7hills
Seven Hills Wetland values 091117 v6.docx

fyi

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Fri 9/8/2017 7:36:45 PM
Subject: Fw: Seven Hills Mine - USEPA Letters
03-17-16 Letter from USEPA and USFWS .pdf
04-14-16 Letter from USEPA.pdf
05-10-16 Letter from USEPA.pdf
05-18-16 Letter from USEPA.pdf

fyi

Please find attached the USEPA official correspondence that we received during the public notice comment period.

Ann

Ann Nelson, PE | Sr. Engineer | Midwest
566 Dickeyville Road | Lynnvile, IN 47619 | ann_nelson@peabodyenergy.com
Office 812.922.1046 | Fax 812.922.1066



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To: Peck, Gregory[Peck.Gregory@epa.gov]
From: Eric Fry
Sent: Tue 11/21/2017 10:42:38 PM
Subject: Re: DOI Contacts

Thanks

Sent from my iPhone

On Nov 21, 2017, at 4:29 PM, Peck, Gregory <Peck.Gregory@epa.gov> wrote:

*todd_willens@ios.doi.gov

*greg_j_sheehan@fws.gov

*catherine_gulac@ios.doi.gov

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Mon 11/6/2017 8:31:14 PM
Subject: Fw: High Point Public Comments
[20171106082127842.pdf](#)

fyi

To: Peck, Gregory[Peck.Gregory@epa.gov]
From: eric fry
Sent: Tue 9/5/2017 4:17:55 PM
Subject: Fw: Conditional area
[Seven Hills Topo Reduced Wetland Impacts_09-01-17.pdf](#)

here is a further offer from Peabody to condition part of the acreage based on success of mining the first part.

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DEPARTMENT OF THE ARMY
 U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
 CORPS OF ENGINEERS
 REGULATORY DIVISION
 MITIGATION, COMPLIANCE, AND ENFORCEMENT BRANCH
 6855 STATE ROAD 66
 NEWBURGH, INDIANA 47630
 November 1, 2017

Regulatory Division
 ID No. LRL-2013-00444-GJD

RECEIVED
 11-6-17

Mrs. Ann Nelson
 Peabody Energy
 United Mineral Company, LLC
 566 Dickeyville Road
 Lynnville, IN 47619

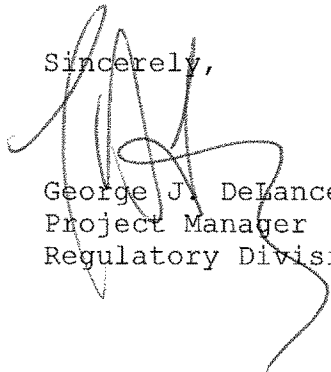
Dear Mrs. Nelson:

This letter is in reference to your application and the subsequent Public Notice for Department of the Army (DA) authorization to discharge fill and/or dredged material into "waters of the United States" on the proposed United Minerals Company, LLC. High Point Mine, located northwest of Boonville, Warrick County, Indiana.

Enclosed for your information is a copy of comment letters received in response to the Public Notice. These letters are being forwarded to you so that you can review any specific concerns they raised. If you feel that any concerns or comments are based on a misunderstanding, or that it can be resolved to the satisfaction of you both, you may wish to contact the commenter's directly with this office's participation and/or advise this office directly.

Please provide a written response to this notification within 30 days of receipt of this letter to outlining how you would like to proceed with addressing these comments. If you have any questions regarding the requested information, please contact this office by writing to the above address, ATTN: CELRL-RD-MCE or by calling me at (812) 842-2807.

Sincerely,


 George J. DeLancey
 Project Manager
 Regulatory Division

Enclosure

Copy Furnished to:

DeLancey/RD-MCE

10/14/2018



Indiana Department
of Natural Resources

Eric Holcomb, Governor
Cameron F. Clark, Director

Division of Reclamation
14619 W. State Road 48
Jasonville, IN 47438-7056
October 13, 2017

U.S. Army Corps of Engineers
Louisville District
Attn: Mr. George DeLancey
6855 State Road 66
Newburgh, IN 47630



Re: Indiana Dept. of Natural Resources
Archaeology Comments
Public Notice Number LRL-2013-444b-gjd
Surface Mining Permit #S-374

Dear Mr. DeLancey:

The Indiana Department of Natural Resources has reviewed the plans associated with Public Notice Number LRL_2013-444b-gjd submitted by United Minerals Company, LLC for a Department of the Army (DA) Permit, subject to Section 404 of the Clean Water Act. It has been determined that the program instituted by the Indiana Surface Coal Mine Reclamation Act (I-SMCRA) meets all statutory requirements incumbent on the Office of Surface Mining, U.S. Department of Interior, and addresses all provisions of the National Historic Preservation Act and other national legislation and directives regarding treatment of cultural resources. The purpose of the project, as stated on the public notice document is to facilitate the removal of subsurface coal materials.

Prior to any mining related disturbance, a coal mine seeking a permit under the provisions of the Indiana Surface Coal Mine Reclamation Act (I-SMCRA) is required to identify all cultural resources located within the proposed permit boundaries and within a 1,000 foot buffer around those boundaries. All known cultural resources within the proposed permit boundaries are then addressed through the following process:

1. All cultural resources are documented in a manner and by personnel that satisfy all requirements of 312 IAC 21-3 and IC 14-34.
2. All documented resources are evaluated against criteria established by the US Department of the Interior in 36 CFR 60.6.
3. For all sites or properties determined eligible or potentially eligible for listing on the state and/or federal register, a plan consistent with the objectives of historic preservation law is implemented in order to mitigate adverse effects to such resources.
4. Avoidance of potentially significant sites as a mitigation plan is common. This results in isolated "no mining windows" within SMCRA permit boundaries.

10/13/2017
Page 2 of 2

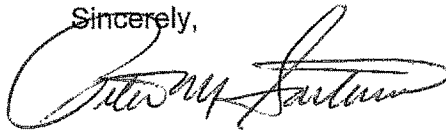
These steps may be undertaken in segments after the general permit is issued but, bond cannot be accepted and no mining or mining related disturbance can be permitted in any area of the proposed mine until all steps in this process have been completed.

The area contained within this request for a Department of the Army Permit, subject to Section 404 of the Clean Water Act is within an area currently permitted in accordance with the Indiana Surface Mining Act, IC 14-34, and any area to be impacted either has been or will require clearance prior to such impact. As a result, any issues related to specific archaeological, prehistoric, or historic sites or structures which might be affected by the proposed work either have already been or will be resolved as a result of the coal mine permitting and bonding process under IC 14-34.

Additionally, any area which is subject to the Section 404 of the Clean Water Act and is to be utilized for mitigation or other purposes that is contained within this proposed Section 404 permit and that is not intended to be permitted and affected in accordance with the Indiana Surface Mining Act, IC 14-34, must undergo review prior to disturbance to determine if archaeological, prehistoric, or historic sites or structures might be affected by the proposed work.

Thank you for the opportunity to comment on this proposed permit. Should you have any questions, please feel free to contact me at (812) 665-2207 or psartoris@dnr.in.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter M. Sartoris", written over a horizontal line.

Peter M. Sartoris
Assistant Director, Technical Services
Division of Reclamation

Cc: J-file
Reclamation Specialist
Tim Wright, Staff Archaeologist



United States Department of the Interior Fish and Wildlife Service



Indiana Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

October 18, 2017

RECEIVED
11-6-17

Mr. George DeLancey
U.S. Army Corps of Engineers
CELRL-RD-MCE
6855 W State Road 66
Newburgh, IN 47630

Dear Mr. DeLancey:

The U.S. Fish and Wildlife Service (FWS) has reviewed Public Notice #2013-444b, concerning an application by United Minerals Company, LLC for a Department of Army permit, pursuant to Section 404 of the Clean Water Act. The application is for stream and wetland impacts associated with a coal mining operation in Warrick County, Indiana.

These comments are consistent with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the U. S. Fish and Wildlife Service's Mitigation Policy, and the Indiana Coal Mining Regulatory Program, Section 310 IAC 12-3-107.

According to the public notice the proposed permit area covers 3,085 acres. The proposed water resource impacts include 85,700 feet of stream channel (53,824 feet ephemeral, 29,777 feet intermittent, and 2,099 feet perennial), approximately 24.5 acres of wetlands (1.63 forested, 21.18 emergent, and 1.69 scrub shrub), and 93 acres of open water.

Wildlife Habitat

The site contains a large upland forest block of about 800 acres in the central portion, known as Big Ditney Hill. This area is of high natural quality, with a diverse mixture of hardwood species, many large trees, a mostly native and open understory, and rugged topography. As such, the permit area provides good habitat for many species of migratory birds and other forest wildlife.

There are multiple records of Indiana bats and northern long-eared bats near the permit area (within 2.5 miles) and it contains abundant summer habitat to support Indiana bat reproductive colonies. The proposed mining activity would temporarily or permanently eliminate approximately 687 acres of summer habitat for this species and restored forest will not become suitable habitat for many years. We recommend the following permit conditions to preserve,

restore and enhance wildlife habitat in the permit area.

1. Minimize surface mining disturbance in Big Ditney Hill, possibly by the use of auger mining. This forest is of good quality and the last natural woodlot in the immediate area.
2. Minimize disturbance of woodlots and forested stream corridors for non-extraction activities.
3. Restore all intermittent and perennial stream networks and their riparian corridors in lengths similar to the pre-mining condition. Restore a network of forested ephemeral drainageways adequate to contain surface stable water flows.
4. Restore all pre-mining forest and wildlife habitat, using native tree and shrub species beneficial for wildlife.
5. Minimize wetland impacts. Unavoidable impacts should be mitigated in the post-mining plan.

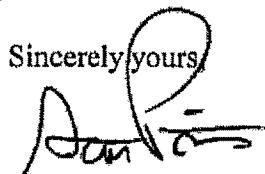
Endangered Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), sheepnose mussel (*Plethobasus cyphus*), and federally threatened northern long-eared bat (*M. septentrionalis*). The sheepnose mussel is restricted to the Ohio River and will not be impacted by the proposed mining operation.

As stated previously, there is known summer habitat for Indiana and northern long-eared bats present throughout the permit area, and the proposed mining operation will eliminate a significant amount of habitat for these species. In accordance with our national biological opinion issued to the Office of Surface Mining, United Minerals Company submitted a revised Indiana Bat and Northern Long-eared Bat Protection and Enhancement Plan (PEP) outlining measures to minimize take of listed bats. The FWS has not completed the review of the revised PEP. Section 7 coordination will not be complete until such time that we review and approve the revised PEP.

For further discussion, please contact Marissa Reed at (812) 334-4261 ext. 215 or marissa_reed@fws.gov.

Sincerely yours,



Scott E. Pruitt
Field Supervisor

cc: Kelsey Pearman, IDNR Division of Reclamation, Jasonville, IN
Andrea Schaller, US EPA, Chicago, IL



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

OCT 19 2017

REPLY TO THE ATTENTION OF:

WW-16J

RECEIVED
 11-6-17

Ms. Lee Anne Devine
 Regulatory Chief
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

Subject: Public Notice LRL-2013-0444b-gjd; High Point Mine, United Minerals Company, LLC,
 Warrick County, Indiana

Dear Ms. Devine:

The U.S. Environmental Protection Agency has reviewed the above referenced Public Notice issued on September 19, 2017 and the revised Clean Water Act (CWA) Section 404 permit application for the proposed surface coal mine in Warrick County, Indiana. Under the revised preferred alternative, United Minerals, LLC (applicant) proposes to impact 85,700 linear feet of streams, 24.5 acres of wetland, and 93 acres of open water. This revision would impact a majority of the 3,084.6-acre site, and stream impacts would increase by 26,353 linear feet.

A copy of EPA's previous comments on this project, dated September 9, 2014, is attached (Attachment 1). Also attached is EPA's April 14, 2016 letter on the adjacent Seven Hills Mine which specifically references this proposed mine (Attachment 2).

The CWA Section 404(b)(1) Guidelines (Guidelines) provide the substantive environmental criteria against which this Section 404 permit application must be evaluated. Based on our review of the public notice and associated permit application materials, the applicant has not demonstrated compliance with several aspects of the Guidelines. These concerns are described in detail below.

Alternatives Analysis

Fundamental to the Guidelines is the premise that no discharge of dredged or fill material may be permitted if a practicable alternative to the proposed discharge exists that would have a less adverse impact on the aquatic environment.¹ For non-water dependent activities, there is a rebuttable presumption that less damaging practicable alternatives exist.

¹ 40 CFR Part 230.10(a)

Offsite Alternatives

The applicant did not discuss offsite alternatives within this application; however, in other pending applications before the Corps, the applicant did discuss the reserves remaining in the Illinois Coal Basin. In its application for the Seven Hills Mine, the applicant highlighted that 17 billion tons of recoverable coal remain in Indiana and 130 billion tons occur within the Illinois Coal Basin, which includes Indiana coal. The applicant needs to consider and discuss offsite alternatives. For example, United Minerals should provide a comparative evaluation of the environmental impacts associated with offsite alternatives within the same coal basin that would meet the basic project purpose and entail recovery from other coal reserves and holdings that it owns or that could reasonably be obtained through a parent company or other contractual relationships.

Onsite Alternatives

On the impact table that begins on page 28 of this revised proposal, the applicant lists the impacts to waters as either "mine support," "mine through," or "avoid," while the operations map only identifies the "avoidance area." On page 15, United Minerals states "[i]mpacts to the previously mined areas will mainly consist of mine infrastructure such as, but not limited to, haulage roads, drainage control structures, temporary coal stock piles areas, spoil fill, spoil and soil storage piles and stream/wetland mitigation." We recommend that the impact table be updated with the details of impacts referenced in the text. Additionally, we recommend the operations map provided within the Corps Public Notice be revised to provide details on the proposed impacts. Once a detailed operations map and updated impact table is provided, a careful review of the proposed impacts may yield opportunities for additional minimization of impacts.

The revised application reduces some direct impacts by relocating the stockpiling and preparation of the coal to the nearby Wild Boar mine. EPA is supportive of efforts to utilize existing support facilities as a way to minimize impacts on the proposed project site. However, the applicant's revised proposal increases overall direct mining impacts to waters of the United States. The revisions include impacts to natural areas and streams that were avoided in the original application. The applicant has not provided justification for the impacts of previously avoided waters, included information in the application to explain why the change in mining was necessary nor discussed why the previous mine proposal is no longer practicable.

In and the revised application, the same phrasing is used to describe the proposed revised alternative as was used to describe the original proposed alternative: "There essentially are no practicable or economical alternatives to the proposed surface mining method of coal extraction." The revision only adds the phrase "utilizing the dragline method." This caveat on the type of surface coal mining does not change the underlying rationale for surface coal mining, and no discussion has been provided in the revised application describing any other type of surface coal mining method. On page 15 the applicant states that "[a] dragline will be employed to efficiently remove the overburden." However, there are no changes made to section D which describe the "preferred action," and both narratives utilize this statement to support the applicant's preferred alternative:

As stated previously, there are no legitimate alternatives to the surface mining method of coal removal for the reserve. The only alternative would be to cease plans for mining, resulting in the loss of high paying jobs, important tax revenue, ancillary economic growth, financial losses on investment to United Minerals Company, LLC and potential interruptions to the coal supply necessary for basic electricity production in the state of Indiana and surrounding states. It

should be noted that, mining returns the land to a natural state as opposed to other land uses such as commercial developments, housing developments, etc.

Under the Guidelines, an alternative is considered to be practicable if it is capable of being done after consideration of cost and technology. The applicant did not address why its original submittal is no longer feasible and why it was not addressed as an alternative. As revised, the application includes more direct impacts to waters of the United States than did the original application, and the applicant has not addressed EPA's concerns related to the analysis of practicable alternatives. EPA believes that the applicant has not demonstrated that the revised application represents the least damaging practicable alternative.

Cumulative Impacts

The applicant does not discuss the extent of historic, contemporaneous and future mining impacts in the watershed. The applicant should discuss these cumulative mining impacts. In addition to the applicant's other proposed mines in the watershed, there is a proposal to expand the Liberty Mine south. Considering the latest revision, pending proposals, and foreseeable impacts, approximately 103 square miles of the Highland-Pigeon Creek watershed are affected.

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Reasonably Foreseeable Mines (Seven Hills Complex and Liberty South Expansion) estimates	~4,000	~6
Total	~66,208	~103

Mitigation and Monitoring

Compensatory mitigation is intended only for unavoidable impacts to waters after the least environmentally damaging practicable alternative has been determined. While the project has not yet met the sequencing requirements of the 404(b)(1) Guidelines, we are providing preliminary comments on the proposed compensatory mitigation.

The applicant has provided a mitigation plan which includes a monitoring and sampling plan based on physical, chemical, and biological performance standards. For some stream impacts the proposed mitigation is 0.5:1. EPA recommends that mitigation for direct stream impacts be calculated based on a ratio not less than a 1:1.

The applicant has not considered or proposed to compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. As such, the mitigation plan does not comply with the 404(b)(1) Guidelines.² The mitigation plan should address all impacts, including secondary and temporal impacts.

² 40 C.F.R. 230.94(c)

The applicant does not propose financial assurances for its proposed mitigation. SMCRA's required bonds do not equate to the financial assurance required in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas. The applicant should include financial assurances which are specific to the successful completion of the mitigation proposed in accordance with appropriate mitigation standards³

The proposed monitoring plan included with the draft permit is insufficient. The monitoring program for this project should include biological, chemical, and physical assessments throughout mining operations, including: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during mining operations to assist in determining potential impacts to aquatic habitat and water quality downstream impacts; and 3) for a minimum of five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. Only groundwater monitoring, per SMCRA requirements, is proposed throughout the duration of mining operations. Stream monitoring location should also be required every 500 feet as originally proposed in the application.

In summary, the High Point Mine, as proposed, does not comply with the 404(b)(1) Guidelines. Please notify us of any response to these comments and any changes to the permit application. We appreciate the opportunity to provide comments on this Public Notice. Please contact Andrea Schaller (312) 886-0746 with any questions regarding this letter.

Sincerely,



Peter Swenson, Chief
Watersheds and Wetlands Branch

Attachment 1 - EPA's September 9, 2014 Letter

Attachment 2 - EPA's April 14, 2016 Letter

cc: Michael Ricketts, USACE – Louisville (via email)
George DeLancey, USACE - Louisville (via email)
Jason Randolph, IDEM (via email)
Scott Pruitt, USFWS – Bloomington (via email)
Marisa Reed, USFWS – Bloomington (via email)

³ 40 CFR 230.93(n)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WW-16J

SEP 09 2014

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

Subject: Public Notice LRL-2013-0444-rjb; High Point Mine, United Minerals Company, LLC, Warrick County, Indiana

Dear Colonel Beck:

The U.S. Environmental Protection Agency has reviewed the above referenced Public Notice issued on August 8, 2014, and the related Clean Water Act (CWA) Section 404 permit application for the proposed surface coal mine in Warrick County, Indiana. Under the preferred alternative, the applicant proposes to impact 59,347 linear feet of jurisdictional streams and 45.72 acres of jurisdictional wetlands for the construction of the 3084.6-acre High Point Mine. The proposed High Point Mine is located between the previously permitted Liberty Mine and pending Seven Hills Mine. The property boundary for all three mines is largely within the Pigeon Creek watershed.

Based on the information contained in the Public Notice, Section 404 permit application materials, and additional project information provided by the U. S. Army Corps of Engineers (Corps), EPA finds that this project may have substantial and unacceptable adverse impacts to Pigeon Creek, its floodplain and its watershed.

Environmental Impact Statement

Section 102(2)(C) of NEPA identifies major federal actions that "significantly" affect the quality of the human environment requiring an environmental impact statement (EIS). "Significantly" under NEPA regulations is defined by two criteria: context, and intensity of impacts of the proposed project.¹ "Context" refers to the affected environment in which a proposed action would occur, and "intensity" means the degree to which the proposed action would minimally include one or more of the factors listed below. As proposed, the High Point Mine appears to exceed thresholds for significance based on the context and intensity of the project. For the following reasons, EPA strongly recommends that the Corps consider an EIS for this project:

¹ 40 C.F.R. § 1507.27

- **Cumulative Impacts:** As stated above, the High Point Mine will be located between the permitted Liberty Mine and the pending Seven Hills Mine. These mining activities would likely lead to impacts that are cumulatively significant. The cumulative impacts from the High Point Mine and other permitted and proposed mines could significantly impact human health and the environment, and would be grounds for the preparation of an EIS.
- **Public Health or Safety:** The proposed mine may raise environmental justice concerns. Nearby communities could be disproportionately impacted by the proposed mine given that the proposed mine would be located between two proposed and operating mines, further exacerbating existing exposures to sensitive populations. Nearby communities may be exposed to multiple mine-related impacts, including fugitive dust, noise, and water discharge. The potential for public health and safety risks will be increased, creating the necessity for an EIS to be prepared.²
- **Threatened and Endangered Species:** The proposed High Point Mine is within the range of the Federally Endangered Indiana bat (*Myotis sodalis*) and proposed endangered northern long-eared bat (*Myotis septentrionalis*). According to a U.S. Fish and Wildlife Service (USFWS) letter dated August 26, 2014, there are multiple records of both species within 2.5 miles of the project area. The proposed area contains abundant summer habitat that supports Indiana bat reproductive colonies. The proposed mining activity would temporarily or permanently eliminate approximately 545 acres of Indiana bat summer habitat.

As stated in previous correspondence and reiterated above, EPA believes the proposed project should be analyzed in conjunction with other similarly proposed projects in the area, including the pending Seven Hills Mine. The operation of these mines relies on shared infrastructure, including the preparation plant. This qualifies the permitting of these mines as connected actions, which should be analyzed in one NEPA document.

If a formal EIS is not required, the applicant will still need to complete a thorough cumulative impacts analysis as required under the CWA Section 404(b)(1) Guidelines (Guidelines).³ This analysis should consider both environmental justice concerns and endangered species.

Cumulative Impacts

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines, the applicant should prepare a cumulative impacts analysis that details the changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct and secondary impacts from previous and current actions, as well as impacts from future actions as a result of changes in surface and groundwater hydrology.

A CWA Section 404 permit was issued for the nearby Liberty Mine, LRL-2010-218-gjd, in April 2012. The Liberty Mine permit authorized impacts to 20,343 feet of streams and 99.4 acres of wetlands just to the south and east of the proposed High Point mine; there is currently a request to modify the Liberty Mine permit to impact an additional 5,035 linear feet of streams, 34 acres of wetlands and 30 acres of open water. The preliminary proposal for the Seven Hill's Mine, just west of the proposed High Point

² 40 C.F.R. § 1507.27(b)(2)

³ 40 C.F.R. § 230.11(g)

Mine, would impact approximately 458.2 acres of wetlands and 31,762 linear feet of streams. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands. The vast majority of impacts from these three mines will occur within the Pigeon Creek watershed in northwestern Warrick County. While the Liberty Mine has already been permitted, the proposed High Point Mine and Seven Hills Mine should be considered a single permitted project since both are owned by United Minerals Company, appear to be at similar stages of development in the permitting process, and the preparation plant serving both operations would be constructed on the High Point site.

In an August 26, 2014 letter to the U.S. Army Corps of Engineers Newburgh Field Office, USFWS noted the permit area contains high quality natural habitat, including good habitat for many species of migratory birds and other forest wildlife, and contains a diverse mixture of hardwood species. EPA considers Pigeon Creek, its tributaries, and its forested floodplain wetlands to be valuable resources which provide unique, high quality natural habitat, support endangered species, and serve significant biological functions. We agree with USFWS that the area possesses special ecological characteristics of productivity, habitat, and wildlife protection, which are important and easily disrupted ecological values. Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. Based on the quantity of impacts to quality resources, as well as the extent of cumulative impacts of mining on the Pigeon Creek watershed, EPA believes the project, as proposed, will result in significant degradation of waters of the United States.⁴

Avoidance and Minimization

The Guidelines require that the applicant demonstrates there are no practicable alternatives available that would have a less adverse impact on the aquatic environment for non-water dependent activities. The Guidelines presume that less damaging upland alternatives are available for these activities. In the 404 application, the applicant stated that it examined potential avoidance and minimization opportunities, but no detailed information regarding this effort was provided. EPA requests the applicant provide more detailed information (i.e. maps and narrative) which details and supports its avoidance and minimization efforts under the preferred alternative. Specific information detailing the areas of the project that overlap with other proposed mining projects (i.e. Seven Hills) in relation to the location of avoided areas is needed. The additional information on avoidance and minimization is necessary for the Agencies to determine compliance with the Guidelines.

Mitigation and Monitoring

The applicant has provided a mitigation plan, which includes a monitoring and sampling plan based on physical, chemical, and biological performance standards. EPA believes that the amount of mitigation proposed to compensate for direct impacts is consistent with other approved projects in the area; however it fails to consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With the two abutting mines in the same watershed, it is imperative to take connectivity into account when designing mitigation. As such, the mitigation plan as currently stated does not appear to comply with the 404(b)(1) Guidelines.⁵ The following must be considered in the mitigation plan:

⁴ 40 C.F.R. § 230.10(c)

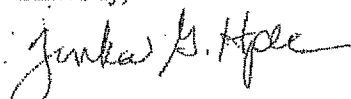
⁵ 40 C.F.R. 230.94(c)

- The mitigation plan should evaluate the full range of impacts considered under the 404(b)(1) Guidelines, including secondary and temporal impacts.
- Financial assurance is stated as being provided under their SMCRA permit. The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas.
- The proposed monitoring plan included with the draft permit is insufficient. The monitoring program for this project must require biological, chemical, and physical assessments throughout mining operations, including: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during mining operations to assist in determining potential impacts to aquatic habitat and water quality downstream impacts; and 3) for a minimum of five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. Only groundwater monitoring, per SMCRA requirements, is proposed throughout the duration of mining operations.

In summary, EPA believes the High Point Mine, as proposed, may have substantial and unacceptable adverse impacts on Pigeon Creek, its tributaries and its forested floodplain wetlands. EPA objects to the project as proposed because it does not comply with the 404(b)(1) Guidelines. An EIS should be considered for this project, in concert with the pending Seven Hills project.

Please notify us of any response to these comments and any changes to the permit application. We appreciate the opportunity to provide comments on this Public Notice. Please contact Holly Arrigoni (312-886-0995) with any questions regarding this letter.

Sincerely,



Tinka G. Hyde, Director
Water Division

Enclosure

cc: Robert Brown, USACE - Louisville (via email)
David Carr, IDEM
Scott Pruitt, USFWS - Bloomington
Ramona Briggeman, IDNR Division of Reclamation, Jasonville, IN



United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

September 22, 2017

Ms. Lee Anne Devine
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

UNITED MINERALS COMPANY, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
U.S. Army Corps of Engineers Project No. LRL-2013-635-gjd
Conditional Permit Approval

Dear Ms. Devine:

Please accept this letter as formal documentation of our proposal to include a permit condition on the above referenced application. This proposal was provided in an email sent to Colonel Gant by Kemal Williamson on September 1, 2017. As you are aware, prior to our meeting August 31, 2017 in Louisville we reevaluated the mining plan and significantly reduced the wetland impacts by an additional 144 acres. This change has been made with the intent of being able to move the permit forward with a robust Environmental Assessment. Sound scientific and engineering analysis, as well as, numerous past mining examples have been provided that demonstrate significant negative impacts to the adjacent wetlands are not expected.

In addition to the significant reduction in impacts and supporting analysis, an additional 140 acres of wetlands on the north end of the mining reserve has been identified and proposed for a restricted "Conditional" approval. This will reduce the wetlands initially proposed for impacts to approximately 200 acres and provide 4-5 years of mining at a 1M tons/year rate. During that time, the Corps can closely monitor whether or not significant indirect impacts occur and our performance on reclamation and mitigation. If the indirect impacts are significant and/or we are not performing the mitigation as required then the permit "Condition" is not met. As a result, Peabody is not allowed to continue mining into the 140 acres of wetlands shown on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and we can continue mining the adjacent 140 acres. An appropriate Adaptive Management Plan can be established to monitor for indirect impacts.

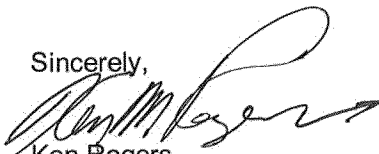
We believe the 'conditional approach' is very reasonable and should alleviate remaining concerns. Permit conditions are common practice in most all permits required for coal mining and are effective in addressing issues such as this.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
"Conditional" Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

If you have any questions or comments, I can be reached at **812.922.1044** or via email at **<Krogers@peabodyenergy.com>**. We look forward to continue working with you and others on this important project.

Sincerely,



Ken Rogers
Director Environmental Services
Authorized Representative

Enclosures

cc: Seven Hills Mine - Permit Binder (1x)

Aquatic Resource of National Importance (ARNI) Claim

- USEPA listed the following as factors for elevation of Pigeon Creek, the forested wetlands along Pigeon Creek, and the Ohio River to ARNI status: economic importance, rare and uniqueness, and importance of quality of resources to quality of Nation's waters.

Economic importance

- Aquatic resources will be increased significantly through on-site and off-site mitigation and numerous enhancements proposed to date.

Economic importance of project:

- Economic value of the aquatic resources will be increased while at the same time critically needed jobs and tax revenue will be provided to the Warrick County Area economy. Based on 2020 financial data, the Seven Hills Mine will have a total sales impact of over \$94 million, a total wages and benefits impact of over \$20 million, and a total employment impact of 217 jobs during 2020. The company also will pay local property taxes totaling \$126,000 in 2020.

Rarity & uniqueness

- The Seven Hills wetlands are valuable, but not rare or unique and the adjacent Pigeon Creek is a low quality stream. Pigeon Creek is a straightened dredged channel that is actively eroding.
- 2017 HGM scores range from 0.68 to 0.95 on the overall wetlands west of Pigeon Creek. The HGM scores range from .88 to .91 within the new proposed 348 acre disturbance area. The HGM scores do not indicate rarity or uniqueness, but only provide a relative comparison to reference standard wetlands in western Kentucky. Eco-Tech completed an HGM assessment on an undisturbed forested wetland adjacent to Peabody's Francisco Mine. This random wetland produced a 0.94 FCI score.
- Pigeon Creek only floods 2-7 days per year on average. The HGM analysis does not account for the limited duration of overbank flooding from Pigeon Creek. The HGM component for "Temporarily Store Surface Water" does not differentiate between an overbank flooding frequency of 1 time/year versus a frequency of 20 times/year. Therefore, the low overbank flooding occurrence and short duration seems to be weighted inappropriately in the HGM assessment method. Mitigation efforts can enhance and improve the connections to Pigeon Creek.
- The direct upstream watershed to the floodplain wetlands is very small, only 2,110 acres.
- The tree species are not rare or unique. 80% of the wetlands on the west side of Pigeon Creek have been farmed in the past with most also being extensively logged. The previous farm fields became forested wetlands by merely ceasing farming operations and allowing less desirable tree species to establish. Many of the tree species present are not allowed by the Corps to be used in mitigation plantings. The HGM assessment method gives full value to a variety of trees including green ash and red maple, which the Louisville District does not allow to be planted for mitigation. Conversion of current desirable agricultural fields to forested wetlands (for off-

site mitigation), utilizing higher quality hardwood tree species will result in even higher value wetlands than exist at Seven Hills. The current tree species, age and size are not special or unique and are typical of southwest Indiana.

- A professional forester completed a species survey and assessment and confirmed that there are no rare or unique species found. The majority of the site contains tracts of even stands of trees that range in size from saplings to small saw logs. There are some larger trees that are concentrated on drier portions of the area. No rare flora or fauna have been noted through record searches, delineations or HGM assessments.
- With the proposed direct wetland impacts totaling 348.02 acres, the proposed permit disturbs less than 2.1% of the forested wetlands and less than 1.7% of the total Highland-Pigeon Creek watershed wetlands as well as approximately less than 1% of the forested wetlands in the Ecoregion based on GIS analysis utilizing hydric soils and land cover.
- The Pigeon Creek wetlands are considered riverine. Riverine wetlands occur in floodplains and riparian corridors in association with stream channels. Pigeon Creek has been straightened and dredged through the permit area where it has become disconnected to direct access to the floodplain. There are some openings along the levee of Pigeon Creek that allows floodwaters to penetrate into the wetlands. These connections are actively headcutting and will continue to erode through gradually degrade the wetlands.
- All of the streams in the permit area have evidence of headcutting and entrenchment due to the drop in base level of Pigeon Creek when it was channelized. Channel substrates are primarily silt/clay with a few having isolated gravel deposits and areas of exposed hardpan.
- Biological baseline data taken at the site attain a rating of “fair”, similar to what you would find in agricultural watersheds in Indiana. This certainly does not indicate a rare or unique site with respect to biology.
- Regardless of the sites potential to filter nutrients, there is not a significant source of nutrients in the immediate watershed and the infrequent flooding reduces any potential further. Recent nutrient sampling indicates similar concentrations exist both above and below the site.
- Protection and enhancement plans (PEP) are currently approved in the State DNR mining permit to address the protection of endangered species. Peabody assumes presence of potential or likely species and follows the PEPs to protect species during mining operations and provides enhanced habitat(s) in its reclamation plans. Peabody has also offered to place a conservation easement on a previously identified Indiana Bat roost tree and adjacent area located approximately 3 miles south of the mining area. Also, the recent reduction in mining impacts, provides a minimum undisturbed wooded buffer of 580 feet in width along the west side of Pigeon Creek, which serves as an additional protective measure.
- Indiana DMR provided a letter stating that they did not believe the site qualified as an ARNI.
- SMCRA mining permit issued 2014. This permit regulates wetlands and streams. Additionally the SMCRA authority provides a cumulative hydrologic impact analysis of the site by mining professionals.

Importance of resources to quality of Nation's waters

- Concerns over indirect impacts to adjacent wetlands are not expected. Seepage analysis, floodway modeling and extensive past experience at other adjacent or nearby mining sites provides sound engineering and scientific evidence that indirect impacts will not occur. Past mining includes the Lynnvill Mine (east side of Pigeon Creek), Ayrshire Mine (west side of Pigeon Creek), Francisco Mine (Gibson County) and the Columbia Mine (Gibson County and Pike County). It should be noted the Columbia Mine was located immediately adjacent to the thousands of acres of wetlands in the Patoka River Bottoms and is now part of the US Fish and Wildlife Service Patoka National Wildlife Refuge.
- Any water discharges from the mine site will be monitored and must meet Indiana water quality standards and any requirements set forth in the NPDES permit. Peabody has an exceptional record of compliance in meeting its NPDES and water quality requirements in Indiana and all US states in which it operates coal mines. Biological monitoring will evaluate any potential effects to aquatic life.
- Disturbances to the forested wetlands will not occur at once. Mining and concurrent reclamation will occur over an extended period of time. All off-site mitigation will occur in advance or concurrently.
- The Net Environmental Services Analysis (NESA) demonstrates that the environmental values of the on-site mitigation will double in a 50-year period over the current wetland conditions.
- Impacts to jurisdictional waters are significantly smaller in size than some previous permits where an EIS was not required.

In conclusion

- The use of the ARNI designation to veto a permit or heighten review is of questionable legal application. Furthermore, designating the wetlands at Seven Hills an Aquatic Resource of National Importance is an improper use of the provision and cannot be supported by facts.
- The project does not involve unacceptable adverse impacts based on the factors listed in the 1992 Memorandum of Understanding as explained above. Forested wetlands will be increased and enhanced by the project. This mining project is likely the only possibility of significantly increasing forested wetlands in this watershed in the foreseeable future.
- The use of NESA analysis quantifies the fact that the proposed onsite mitigation will provide significant long-term environmental lift even without the addition of the off-site mitigation.

**AQUATIC ASSESSMENT REPORT
PROPOSED SEVEN HILLS SURFACE MINE
WARRICK COUNTY, IN**



Prepared for:

**Peabody Energy
Lynnville, Indiana**

Prepared by:

**Eco-Tech Consultants, Inc.
Louisville, KY**

September 2017





AQUATIC ASSESSMENT REPORT PROPOSED SEVEN HILLS SURFACE MINE WARRICK COUNTY, IN

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FIGURES

FIGURE 1 **Project Location Map**

APPENDICES

APPENDIX A	Representative Photographs
APPENDIX B	EPA RBP forms and supplemental stream habitat forms
APPENDIX C	Raw data (2017)-water chemistry, macroinvertebrates, fish
APPENDIX D	Data tables of previous survey effort (2011) - water chemistry, macroinvertebrates, fish

1. INTRODUCTION

Eco-Tech Consultants, Inc. (Eco-Tech) was contracted by Peabody Energy of Lynnville, Indiana to assess current aquatic conditions at a proposed surface mine in Warrick County, Indiana. The proposed site is within the Seven Hills Permit Area. Eco-Tech has previously performed an aquatic assessment at this location in 2011, along with several other ecological studies.

2. STUDY AREA

The project area is within the Southern Wabash Lowlands (U.S. Environmental Protection Agency [U.S. EPA] Level IV ecoregion). This area is characterized by an undulating landscape consisting of many wide, shallow valleys. Soils are neutral to acid ic, and originally the area was covered with oak-hickory forests on upland sites and mesophytic forests on lowland sites. Row crop agriculture and surface mining are prevalent land uses within the landscape surrounding the project area (Woods et al. 1998).

The site is bound on the north by Seven Hills Road (County Road 750 N) and to the south by Boonville-New Harmony Road (County Road 400 N) on the Daylight, Boonville, and Elberfeld, Indiana USGS Topographic Quadrangles. The permit area lies mostly within the western floodplain of Pigeon Creek. Various roads and trails occur throughout the project area (Figures 1). The total acreage of the site is 1,680 acres and is predominantly forest with some cropped areas and former mine impoundments.

Pigeon Creek is a fourth order tributary to the Ohio River. The stream's watershed drains approximately 225 square miles near the southern terminus of the project area (USGS, 2012). Pigeon Creek has been extensively channelized, and remnants of the original course exist as scrolling wetlands and oxbows visible on aerial imagery (Figure 1). The aquatic study area is within the Highland-Pigeon Creek drainage basin (HUC 05140202).

3. METHODS

Potential sample locations were identified using GIS data and knowledge of the site collected during previous studies, and three of the sites (AS1, AS2, and AS3) were previously sampled by Eco-Tech (2011b). Six potential sample locations with intermittent or perennial flow regimes were assessed to determine if suitable habitat was present to maintain aquatic assemblages that could be adequately sampled. Five of the proposed six sites contained flowing water at the time of sampling and were included in the survey: one site on an intermittent tributary stream and four sites on the mainstem of Pigeon Creek (one upstream of the proposed mine, one at the upper end of proposed mine, and two below the proposed mine area) (Figure 1). Proposed aquatic site 4 (AS4) did not have adequate stream flow to sample (Appendix A).

Eco-Tech collected information on stream habitat characteristics, water chemistry, and fish and benthic macroinvertebrate communities on August 28 -29, 2017 . Data collection was completed using the most current Indiana Department of Environmental Management (IDEM) standard operating procedures obtained from IDEM staff Ali Meils and Stacey Sobat (pers. comm., 8/23/2017).

3.1. Stream Habitat Description

Sample points were photographed and assessed according to the U.S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocol (RBP) for low -gradient streams and IDEM *Procedures for Completing the Qualitative Habitat Evaluation Index (QHEI) B-003-OWQ-WAP-XX-16-T-R0 Technical Standard Operating Procedure (2016)* by Eco-Tech staff . Drainage areas were delineated using the US Geological Survey web interface program StreamStats (v4.1.2; USGS 2012).

3.2. Water Quality Sampling

Water temperature, dissolved oxygen, and total dissolved solids were measured in the field with a handheld YSI 85 system (YSI Incorporated), and pH was measured with a pHTestr 1 (Oakton). Eco-Tech collected water samples for measurement of additional parameters and delivered them to Rosedale Services, Inc. in Boonville, Indiana. Levels of total iron, total manganese, acidity, alkalinity, and total dissolved solids were determined.

3.3. Macroinvertebrate Community Assessment

IDEM Aquatic macroinvertebrate sampling followed the protocol as defined in *Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0 Technical Standard Operating Procedure (2014)*.

Sweep samples were used to collect macroinvertebrates at each aquatic sample point . During the sweep sample, best professional judgment and experience were used to sample as many microhabitats (rootwads, emergent vegetation, woody debris, leaf packs, sandy and silty substrates, and cobble and gravel substrates) as possible, sampling these microhabitats in 1.5-2 meter intervals along 50 meters of shoreline habitat. Due to the fact that the streams are low gradient, and no substantial riffles were present at the proposed sample points, riffle kick samples were modified for short riffles, runs, and glides according to MHAB procedures.

Samples were elutriated, and placed into a white sorting tray. Samples were picked for 15 minutes, and the resulting subsample of invertebrates was preserved in 70 percent ethanol. Invertebrates were identified by Pennington and Associates, Inc. (Cookeville, TN) to “lowest practical taxon” as per IDEM guidance.

Taxa numbers were tabulated to calculate metrics used to produce the Indiana macroinvertebrate Index of Biotic Integrity (mIBI). The metrics were calculated using tolerance values, feeding groups, and habit behavior classifications provided by IDEM in their “Indiana Macroinvertebrate Taxa Attributes” document. Values were then assigned to a ranking system and summed to produce the mIBI according to instructions provided by IDEM in their “Calculating IDEM Macroinvertebrate Index of Biotic Integrity (mIBI)” document (provided by Ali Meils, IDEM Senior Environmental Manager).

3.4. Fish Community Assessment

Fish communities were sampled using a backpack electrofisher (Halltech Aquatic Research Inc. HT2000B/MK5) according to protocols designed by IDEM’s Surface Water Quality Assessment Program (provided by Stacey Sobat, IDEM Section Chief for the Probabilistic Monitoring Program). A length of stream equal to 1.5 times the stream width was sampled, ensuring equal and representative coverage of both banks. At least one individual per species, per site was preserved as a voucher specimen, as well as any unidentified specimens. All individuals were identified and enumerated by an Eco-Tech biologist familiar with low gradient stream fauna of southwest Indiana.

Taxa numbers were tabulated to calculate metrics used to produce an Index of Biotic Integrity (IBI). The metrics were calculated using sensitivity categories, trophic guilds, reproductive guilds, and additional classifications provided by IDEM in their document entitled “Appendix with Taxa Characteristics for IBI Calculations.” Values were then assigned to a ranking system and summed to produce the IBI according to instructions provided by IDEM in their document entitled “Interior River Lowland Calibration Summary” (provided by Stacey Sobat, IDEM Manager Section Chief for the Probabilistic Monitoring Program). Qualitative descriptors for IBI scores were provided by IDEM.

It should be noted that high levels of total dissolved solids were observed which can be problematic with electroshocking (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995). Typical voltage levels had to be reduced in order to prevent electrical overloading of the backpack unit. In order to offset this, additional time and surveyed area was added to the effort at each location. Fish seining was largely impossible due to the high accumulation of coarse woody debris anchored in the fine sediment.

4. RESULTS

4.1. Stream Habitat Description

Stream channels at all five sample sites have been altered by human activities. Pigeon Creek (sites AS1, AS3, AS5, and AS6) has been extensively channelized, and site AS2 is on a channel that appears to be a man-made conveyance built to drain a final cut impoundment from previous surface mining activities. EPA RBP habitat assessment and IDEM Qualitative Habitat Evaluation Index (QHEI) forms are provided in Appendix B. Stream characteristics are summarized in Table 1.

Sites on Pigeon Creek (AS1, AS3, AS5, and AS6) received lower RBP and QHEI scores than AS2 due to a lack of canopy cover, homogeneous fine substrate, and little development of diverse aquatic habitats. Sites AS5 and AS6 received higher QHEI scores than AS1 and AS3 primarily because of greater bank stability and habitat heterogeneity. Channel substrate at all sites is primarily silt/soil; however, a few isolated gravel deposits and areas of exposed hardpan comprised of clay and gravel were noted. Within the sections of Pigeon Creek surveyed, fine sediment bars were observed forming in the center of the stream channel. Sites AS1 and AS3 received scoring indicating impaired waterways. Photos of sample locations are provided in Appendix A.

Previous stream habitat analysis noted that stream AS1, AS2, and AS3 received EPA RBP scores of 126, 47, and 126, respectively. The scoring from previous years is similar to the current survey (Appendix D). Site AS2 did receive higher RBP scoring likely due to beaver impact having a stabilizing effect on flow regime and the progressive growth of woody vegetation within the riparian habitat in the years between survey years.

Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Flow Regime	Dominant Channel Material	IDEM QHEI Score	EPA RBP Score
AS1	Perennial	Silt	46	112
AS2	Intermittent	Gravel	45	88
AS3	Perennial	Silt	48	102
AS5	Perennial	Gravel	53	96
AS6	Perennial	Silt	52	107

4.2. Water Quality Results

Physical and chemical parameters measured at the five aquatic sample sites are provided in Table 2. These measurements will provide monitoring data, which can be compared to previous conditions. Water quality standards for aquatic life in Ohio and Illinois River from Indiana's Administrative Code, Minimum Surface Water Quality Standards (327 IAC 2 -1-6), have a dissolved oxygen (DO) lower standard of 4.0 mg/L. All sample sites from this survey were at or below this standard, indicating a strong organic component in the system and lack of habitat and gradient to adequately oxygenate the water column.

Total dissolved solids (TDS) at all five sites are elevated. While IDEM does not have an aquatic life standard for TDS, elevated water salinity, as measured by specific conductivity and a dominant component of TDS, has been shown to negatively affect aquatic life in freshwaters (U.S. EPA 2016). This parameter may reflect anthropogenic land use influences in the watershed and may also be driven by a strong groundwater hydrologic influence. Although the survey data of TDS and DO indicate water quality may be at levels to cause stress to aquatic organisms, it was not determined if these results are from naturally occurring sources or from

anthropogenic effects. All other parameters were within typical water quality standards for unimpaired waterways.

Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1	AS2	AS3	AS5	AS6
Temperature (°C)	22.7	25.8	22.9	22.5	23.2
Dissolve Oxygen (DO)	4.00	3.80	3.90	3.87	4.05
pH	8.1	8.2	8	7.9	8.2
Total Dissolved Solids (mg/L)	1440	1100	2110	2230	2070
Total Acidity (mg/L as CaCo3)	<10	<10	<10	<10	<10
Total Alkalinity (mg/L as CaCo3)	313	280	256	344	255
Total Iron (mg/L)	0.16	<0.1	<0.1	<0.1	0.18
Total Manganese (mg/L)	<0.1	<0.1	<0.1	<0.1	<0.1
Total Suspended Solids (mg/L)	<10	<10	11.7	<10	23

Previous physical and chemical parameter by Eco-Tech (2011b) noted that total dissolved solids at sites AS1, AS2, and AS3 were noted to be high at the time of sampling. All other parameters fell within the water quality parameters of the time (Appendix D).

4.3. Macroinvertebrate Sampling Results

Previous macroinvertebrate sampling at AS1, AS2, and AS3 yielded a total of 241 individuals of 32 taxa. The most common taxa sampled at all three sites included clam shrimp (Spinicaudata), narrow-winged damselflies (*Enallagma* spp.), net-spinning caddisflies (*Cheumatopsyche* spp.), and riffle beetles (*Stenelmis* spp.) (Appendix D).

Macroinvertebrate from 2017 sampling effort yielded a total of 1,196 individuals of 77 taxa. Macroinvertebrate IBI scores ranged from 34 to 38, and IDEM considers streams scoring less than 36 to be impaired. All sites exhibited some level of stress to the faunal community making them borderline impaired reaches.

Higher metric scoring for individual sites in general resulted from low percentages of Orthocladiinae and Tanytarsini of Chironomidae, non-insects minus crayfish, and tolerant taxa. The low scores obtained for individual sites in general are the result of several indicators of poor stream health, including the number of EPT (Ephemeroptera, Plecoptera, Trichoptera) taxa, percent shredders and scrapers, and percent collector filterers. The highest score was observed at AS3, and this is due to the fact that the greatest number of individuals and greatest percentage of intolerant taxa were collected there.

While more individuals and taxa were collected in 2017 than in 2011, the taxa observed did not exhibit a high quality macroinvertebrate community. Significant results common among all five sites included narrow-winged damselflies (*Enallagma* sp.), net-spinning caddisflies (*Hydropsyche* sp.), and various midge species (*Polypedilum illinoense* group and *Tanytarsus* sp.).

Taxa that occurred at four of the five sites include d small minnow mayflies (*Callibaetis floridanus*), dancer damselflies (*Argia* sp.), forktail damselflies (*Ischnura* sp.), net-spinning caddisflies (*Cheumatopsyche* sp.), and various midge species (*Dicrotendipes neomodestus* , *Glyptotendipes* sp., *Polypedilum flavum* , *Ablabesmyia mallochi*, *Conchapelopia* sp., and *Procladius* sp.) The most abundant species found at all five sites was *Polypedilum illinoense* group (n=220), and the most abundant species from the entire survey effort was *Cheumatopsyche* sp. (n=243; Appendix C). Some of the taxa (midges and damselflies) are commonly found in lentic habitats (pools) in vegetation, mud, debris, or rootwads, which are common in Pigeon Creek. The small minnow mayflies and net-spinning caddisflies, are often found in areas with more flowing water. Taxa richness was greatest at AS1, AS3, and AS5 most likely to greater habitat heterogeneity between riffle, pool, woody debris, root wad, and leaf pack habitat.

Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Taxa	34	3	20	1	34	3	32	3	30	3
Number of Individuals	216	3	212	3	123	1	495	5	150	3
Number of EPT Taxa	4	1	3	3	2	1	8	3	5	1
% Orthocladiinae + Tanytarsini of Chironomidae	3.2%	5	6.6%	5	4.1%	5	3.4%	5	6.7%	5
% Non-insects Minus Crayfish	7.9%	5	4.7%	5	5.7%	5	1.0%	5	10.0%	5
Number of Diptera Taxa	15	5	8	3	20	5	16	5	14	5
% Intolerant	29.6%	3	42.9%	5	0.0%	1	18.0%	3	14.7%	1
% Tolerant	6.5%	5	3.8%	5	14.6%	3	12.7%	3	8.0%	5
% Predators	18.5%	3	3.3%	1	29.3%	3	17.4%	1	22.0%	3
% Shredders + Scrapers	0.5%	1	0.5%	1	2.4%	1	2.2%	1	2.0%	1
% Collector-Filterers	39.4%	1	87.7%	1	13.8%	3	20.6%	1	28.0%	1
% Sprawlers	2.3%	1	0.5%	1	10.6%	5	3.4%	3	6.0%	5
Total Scores	36		34		36		38		38	

*<36=impaired, ≥36=unimpaired.

4.4. Fish Sampling Results

Previous sampling on Pigeon Creek (Eco-Tech, 2011b) indicated qualitative ratings of fair (AS1 and AS3) and poor (AS2), yielding a total of 295 individuals and 25 taxa. Channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) were found at all three sites. Other relatively populous species (>10 individuals) included black bullheads (*Ameiurus melas*), steelcolor shiners (*Cyprinella whipplei*), blackstripe topminnows (*Fundulus notatus*), and golden shiners (*Notemigonus chrysoleucus*), and two species known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in the 2011 survey is listed as

threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana (Eco-Tech 2011b; Appendix D).

In 2017, sampling yielded 17 fish species. IBI scores ranged from 17 to 24. Fish communities at four sample sites were classified as indicative of poor stream habitat and one site's community was classified as very poor (58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish). The low scores obtained at all five sites were caused by low overall species richness, low minnow species richness, no occurrences of sucker species or sensitive species, and low percentages of carnivorous or pioneer fish and simple lithophiles (fish that lay eggs on rocks). IBI scores for 2017 are lower than the previous survey (Appendix D). Lower fish diversity and number captured individuals could possibly be explained by higher water temperatures, which also increased the ambient conductivity (Kolz and Reynolds 1989; Burkhardt and Gutreuter, 1995), and so fish bio-regulatory processes and behavior were adversely affected for electroshock sampling. The same backpack shocker and operator were used for both surveys. Fish seining to offset the reduction of captured fish was prevented by coarse woody debris distributed throughout the sites on Pigeon Creek.

Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3		AS5		AS6	
	Value	Score	Value	Score	Value	Score	Value	Score	Value	Score
Number of Species	7	1	5	5	8	1	8	1	6	1
Number of Minnow Species	2	1	0	0	0	0	3	0	0	0
Number of Sunfish Species	4	1	3	3	4	1	1	1	3	1
Number of Sucker Species	0	0	0	0	0	0	0	0	0	0
Number of Sensitive Species	1	1	0	0	1	1	1	1	2	1
% Tolerant	30%	3	21%	5	39%	3	32%	3	0%	5
% Omnivore	17%	3	0%	0	0%	5	0%	5	0%	5
% Insectivore	0%	0	0%	0	0%	0	0%	0	0%	0
% Pioneer	N/A		17%	5	N/A		N/A		N/A	
% Carnivore	10%	1	N/A	0	17%	1	4%	1	10%	1
Total # Individuals	30	1	29	1	18	1	50	1	21	1
% Simple Lithophilic Individuals	0%	0	0%	0	0%	0	0%	0	0%	0
% Individuals with Deformities	0%	5	0%	5	0%	5	0%	5	0%	5
Totals	17		24		18		18		20	
Qualitative Rating	Very Poor		Poor		Very Poor		Very Poor		Very Poor	

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish

Green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), and spotted bass (*Micropterus punctulatus*) were found at all three sites. These are habitat generalists, and green sunfish are especially tolerant of adverse habitat conditions, such as sedimentation and low oxygen. Relatively populous species (>8 total individuals) included steelcolor shiners (*Cyprinella whipplei*), mosquitofish (*Gambusia affinis*), warmouth (*Lepomis gulosus*), long-eared sunfish (*Lepomis megalotis*), suckermouth minnow (*Phenacobius mirabilis*), and bluntnose minnow (*Pimephales notatus*). These species are typical inhabitants of pools and vegetation beds of small to medium-sized tributaries of the Ohio River. To a certain degree, they are able to tolerate habitat conditions found in Midwestern low-gradient streams, including warm water temperatures, relatively low oxygen, sedimentation, and non-point source pollution. Only two species which are known to be sensitive to and/or intolerant of pollution were captured: long-eared sunfish (*Lepomis megalotis*) and dusky darter (*Percina sciera*). No species captured in this survey is listed as threatened or endangered by the U.S. Fish and Wildlife or the state of Indiana.

5. SUMMARY

Streams within the project area display several indicators of disturbance and poor water quality. They have been subject to channelization and show very little development of instream habitat and stable substrate. Water quality measurements show significant stressors to aquatic life in the form of high dissolved solids and low dissolved oxygen. Fish and macroinvertebrate communities at all sites reflect a very tolerant aquatic assemblage that is adapted to low gradient streams with inadequate habitat and water quality issues.

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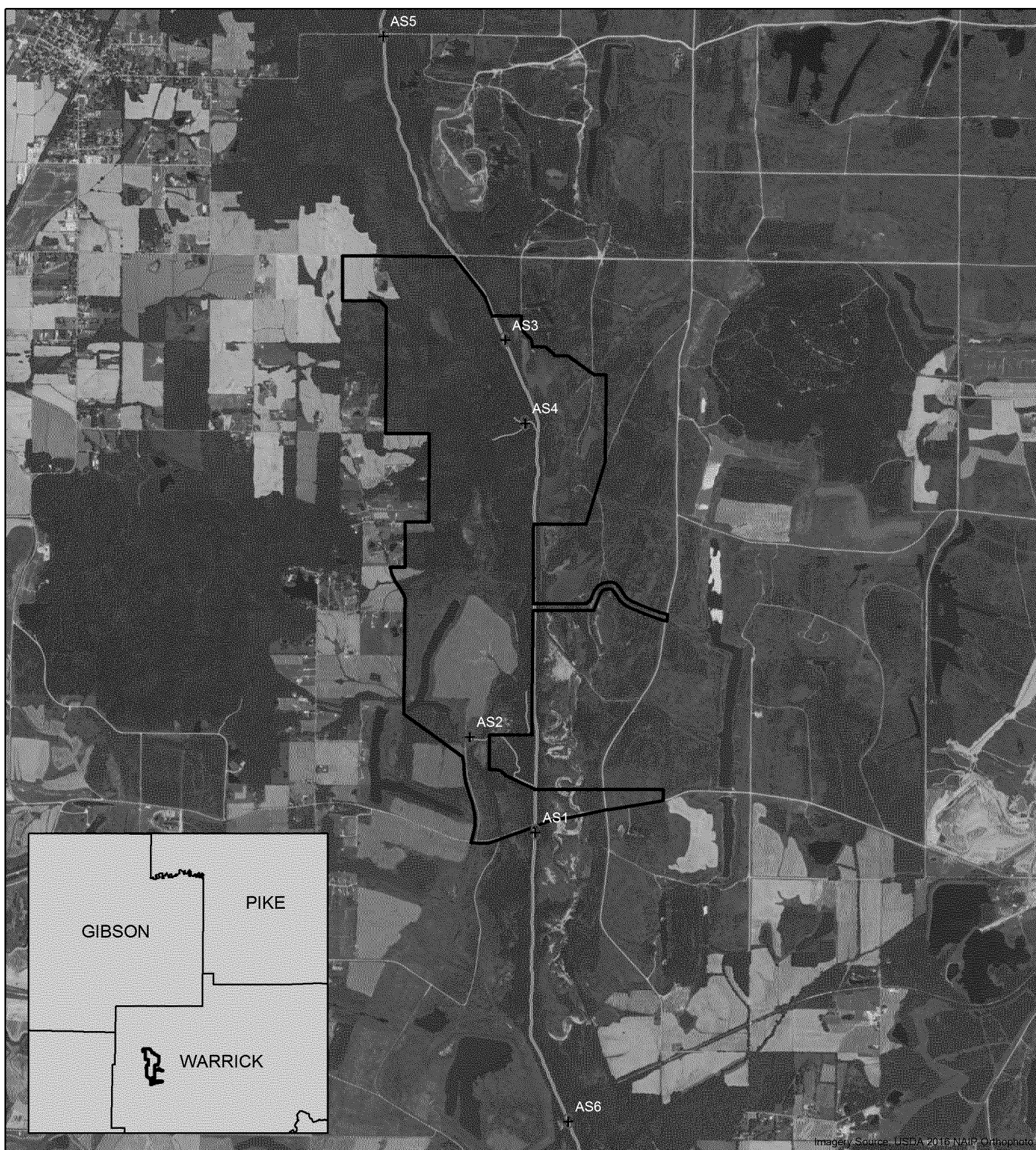
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FIGURES.

FIGURE 1: PROJECT LOCATION MAP



Imagery Source: USDA 2016 NAIP Orthophoto

Legend

⛶ 2017 Aquatic Sample Point

▭ 2017 Permit Boundary

— Pigeon Creek


0 0.5 1 Miles

Figure 1:

Aquatic Sample Points

Peabody Seven Hills Mine

Warrick County, IN

 **Eco-Tech**
CONSULTANTS

Drawn by: RRN

Print Date: 9/15/2017

Project: LV2017025

APPENDIX A.

REPRESENTATIVE PHOTOGRAPHS



Photo 1. Sample point AS1 downstream view from bridge intersection



Photo 2. Sample point AS1 upstream view from bridge intersection



Photo 3. Sample point AS2 downstream view of pool habitat.



Photo 4. Sample point AS2 downstream view.



Photo 5. Sample point AS3 downstream view.



Photo 6. Sample point AS3 downstream view.

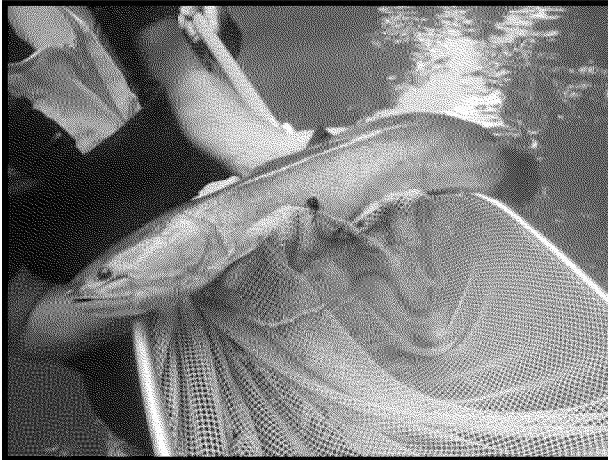


Photo 7. Bowfin (*Amia calva*) caught at AS3.



Photo 8. Sample point AS4 on survey date upstream view. Dry stream bed.

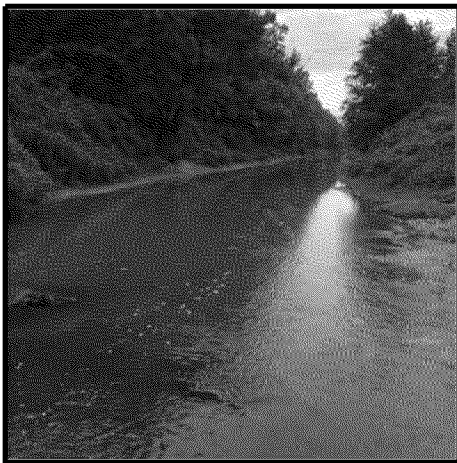


Photo 9. Sample point AS5 downstream view from underneath bridge.

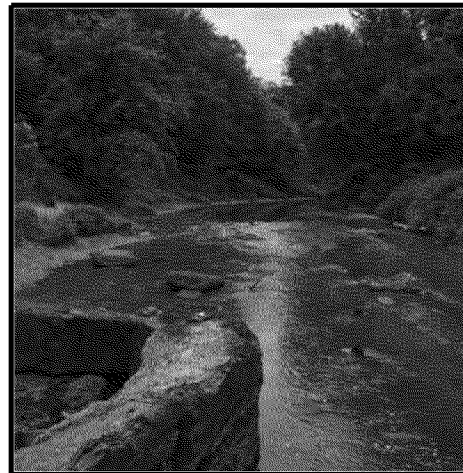


Photo 10 Sample point AS5 upstream view from underneath bridge. Showing clay hardpan.



Photo 11. Sample point AS6 downstream view.



Photo 12. Sample point AS6 upstream view.

APPENDIX B.

EPA RBP FORMS AND SUPPLEMENTAL STREAM HABITAT FORMS

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)						
IDEM	Sample # <u>AS-1</u>	bioSample # <u>—</u>	Stream Name <u>Pigeon Creek</u>	Location <u>39.06617, -87.39377</u>		
	Surveyor <u>Bob Teich</u>	Sample Date <u>8/22/17</u>	County <u>Warrick</u>	Macro Sample Type <u>MHAB, Fish</u>	Habitat <input checked="" type="checkbox"/> Complete	QHEI Score: 52

1) SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

BEST TYPES	OTHER TYPES	ORIGIN	QUALITY
PRESENT TOTAL % P R <input type="checkbox"/> BLD/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5]	PRESENT TOTAL % P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0]	PRESENT TOTAL % P R <input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LAQUSTRINE [0] <input type="checkbox"/> SHALE [-1] <input type="checkbox"/> COAL FINES [-2]	Check ONE (Or 2 & average) S T F <input type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1] Substrate <div style="border: 1px solid black; width: 40px; height: 40px; text-align: center; margin: 5px auto;">2</div> Maximum 20

NUMBER OF BEST TYPES: ☐ 4 or more [2] sludge from point-sources ☐ 3 or less [0]

Comments

2) INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)

% Amount	% Amount	% Amount	AMOUNT
12 1 UNDERCUT BANKS [1] 6 2 OVERHANGING VEGETATION [1] 20 2 SHALLOWS (IN SLOW WATER) [1] 5 1 ROOTMATS [1]	45 3 POOLS > 70cm [2] 1 1 ROOTWADS [1] 5 1 BOULDERS [1]	1 1 OXBOWS, BACKWATERS [1] 1 1 AQUATIC MACROPHYTES [1] 5 1 LOGS OR WOODY DEBRIS [1]	Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input checked="" type="checkbox"/> MODERATE 25 - 75% [7] <input type="checkbox"/> SPARSE 5 - < 25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1] Cover <div style="border: 1px solid black; width: 40px; height: 40px; text-align: center; margin: 5px auto;">14</div> Maximum 20

Comments

3) CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)

SINUOSITY	DEVELOPMENT	CHANNELIZATION	STABILITY
<input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1]	<input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1]	<input type="checkbox"/> NONE [6] <input checked="" type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]	<input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1]

Channel Maximum 20 7

Comments

4) BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)

River right looking downstream	RIPARIAN ZONE	FLOOD PLAIN QUALITY	CONSERVATION
L R <input type="checkbox"/> NONE/LITTLE [3] <input checked="" type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]	L R <input checked="" type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]	L R <input checked="" type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]	L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0]

Indicate predominant land use(s) past 100m riparian: 9

Comments

5) POOL/GLIDE AND RIFFLE/RUN QUALITY

MAXIMUM DEPTH	CHANNEL WIDTH	CURRENT VELOCITY	Recreation Potential
Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7 - < 1m [4] <input type="checkbox"/> 0.4 - < 0.7m [2] <input type="checkbox"/> 0.2 - < 0.4m [1] <input type="checkbox"/> < 0.2m [0]	Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]	Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1]	<input checked="" type="checkbox"/> SLOW [1] <input type="checkbox"/> INTERSTITIAL [-1] <input type="checkbox"/> INTERMITTENT [-2] <input type="checkbox"/> EDDIES [1]

Indicate for reach - pools and riffles. 9

Comments

Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:

RIFFLE DEPTH	RUN DEPTH	RIFFLE/RUN SUBSTRATE	RIFFLE/RUN EMBEDDEDNESS
<input type="checkbox"/> BEST AREAS > 10cm [2] <input checked="" type="checkbox"/> BEST AREAS 5 - 10cm [1] <input type="checkbox"/> BEST AREAS < 5cm [metric = 0]	<input type="checkbox"/> MAXIMUM > 50cm [2] <input checked="" type="checkbox"/> MAXIMUM < 50cm [1]	<input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]	<input type="checkbox"/> NONE [2] <input checked="" type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1]

Riffle/Run Maximum 8 3

Comments

6) GRADIENT (2.44 ft/mi) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6] %POOL: 40 %GLIDE: 35 Gradient Maximum 10 8

DRAINAGE AREA (207.8 mi²) ☐ VERY LOW - LOW [2-4] ☐ MODERATE [6-10] ☐ HIGH - VERY HIGH [10-6] %RUN: 20 %RIFFLE: 5

IDEM 07/06/10

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

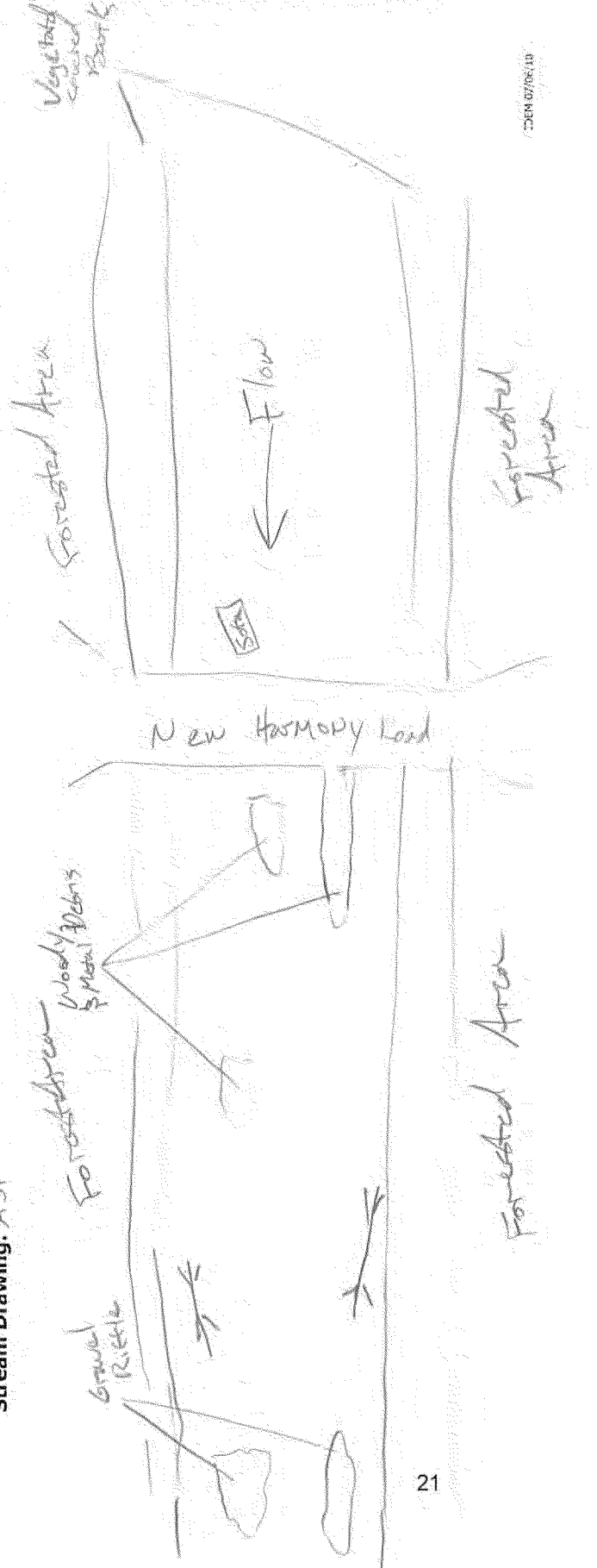
COMMENT

A-CANOPY	B-AESTHETICS	C-RECREATION	D-MAINTENANCE	E-ISSUES
<input type="checkbox"/> > 85% - Open <input type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input type="checkbox"/> Foam/Scum	<input type="checkbox"/> Oil sheen <input type="checkbox"/> Trash/Litter <input type="checkbox"/> Nuisance odor <input type="checkbox"/> Sludge deposits <input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Public <input type="checkbox"/> Private <input type="checkbox"/> Active <input type="checkbox"/> Historic Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old <input type="checkbox"/> Spray <input type="checkbox"/> Islands <input type="checkbox"/> Scoured Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified Leveled: <input type="checkbox"/> One sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armourd <input type="checkbox"/> Slumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Manure <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

	Left	Middle	Right	Total Average
% open	—	—	—	—

Stream Drawing: AS1



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

AS1
(3rd NORTH)

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>12</u>	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>19</u>	20 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE <u>1</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE <u>8</u> (LB)	Left Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
SCORE <u>8</u> (RB)	Right Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0

Total Score 112

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

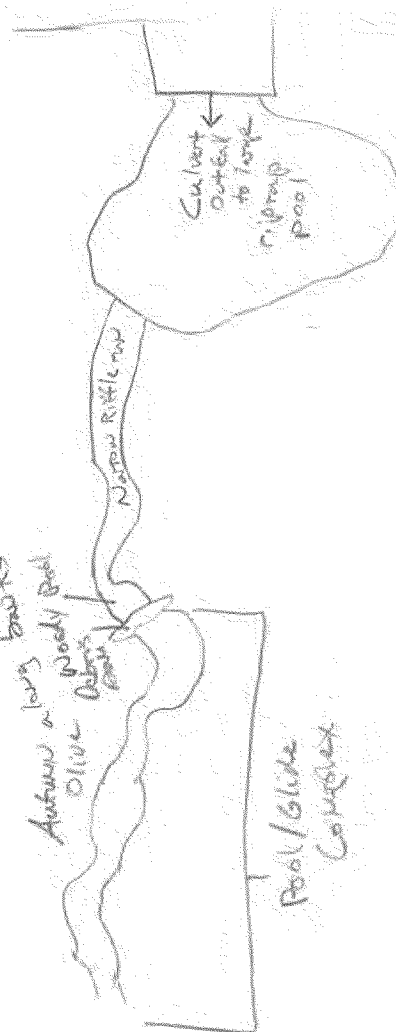
OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

Sample # AS-2	bioSample # —	Stream Name Unalutka Tributary to Pigeon Cr.	Location 38.103602, -87.406135
Surveyor Curtis	Sample Date 8/22/17	County Wash. Co.	Macro Sample Type MHAB/Fish
Habitat Complete			QHEI Score: 45

1) SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present

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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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<input type="checkbox"/>	<input type="checkbox"/>						

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

Stream Drawing: AS2

AS2
(4th NORTH)

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>8</u>	20 19 18 17 16	15 14 13 12 11	10 9 <u>8</u> 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep, very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>5</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<u>5</u> 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>12</u>	20 <u>19</u> 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement, over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>6</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	<u>6</u>	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>5</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	<u>5</u>	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>4</u> (LB)	Left Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
SCORE <u>4</u> (RB)	Right Bank 10 9					8 7 6					5 <u>4</u> 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					

Total Score 88

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

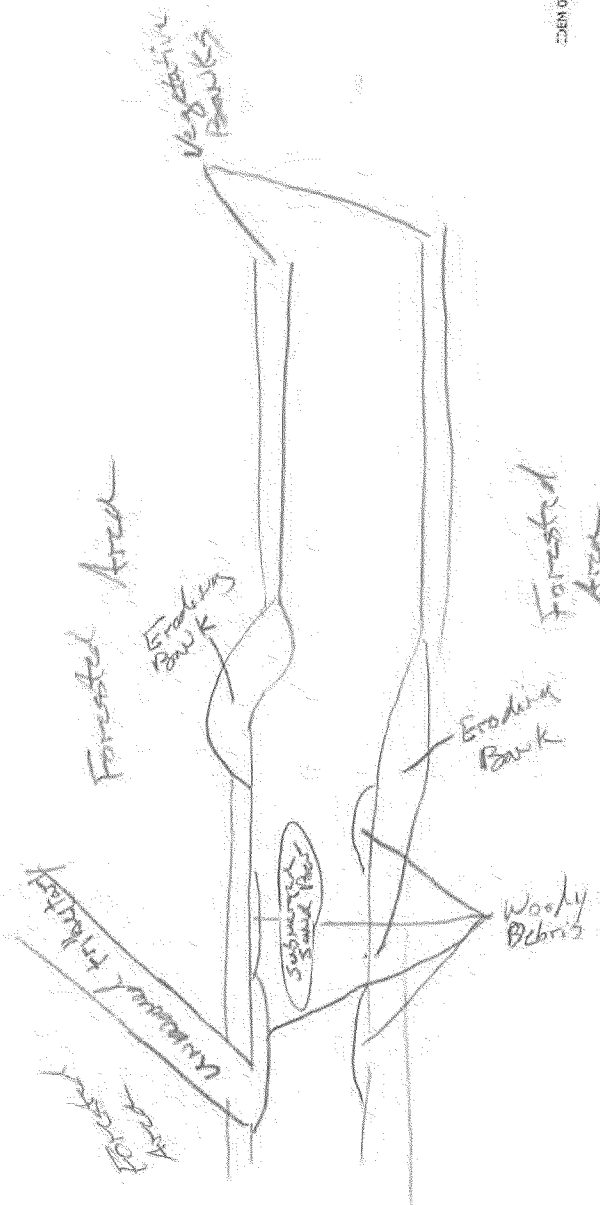
A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input checked="" type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input type="checkbox"/> Trash/Litter	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill	<input type="checkbox"/> BMPs
<input type="checkbox"/> 30% - < 55%	<input type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor	<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Scoured	<input type="checkbox"/> Modified	<input type="checkbox"/> One-sided	<input type="checkbox"/> Both banks	<input type="checkbox"/> Logging
<input type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits	<input type="checkbox"/> Srag	<input type="checkbox"/> Removed	<input type="checkbox"/> Cutoffs	<input type="checkbox"/> Relocated	<input type="checkbox"/> Erosion	<input type="checkbox"/> Bank	<input type="checkbox"/> Surface
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Bedload	<input type="checkbox"/> Moving	<input type="checkbox"/> Stable	<input type="checkbox"/> Armoured	<input type="checkbox"/> Slumps	<input type="checkbox"/> Impounded	<input type="checkbox"/> Desiccated
			<input type="checkbox"/> Flood control	<input type="checkbox"/> Drainage	<input type="checkbox"/> Mine	<input type="checkbox"/> Acid	<input type="checkbox"/> Quarry	<input type="checkbox"/> Flow	<input type="checkbox"/> Natural
					<input type="checkbox"/> Wetland	<input type="checkbox"/> Park	<input type="checkbox"/> Golf	<input type="checkbox"/> Lawn	<input type="checkbox"/> Home
					<input type="checkbox"/> Atmospheric deposition				

Looking upstream (> 10m, 3 readings < 10m, 1 reading in middle); Round to the nearest whole percent

Left	Middle	Right	Total Average
%	%	%	%
X	X	X	

% open

Stream Drawing: A63



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <i>5</i>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<i>(5)</i> 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <i>8</i>	20 19 18 17 16	15 14 13 12 11	10 9 <i>(8)</i> 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <i>14</i>	20 19 18 17 16	15 <i>(14)</i> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <i>10</i>	20 19 18 17 16	15 14 13 12 11	<i>(10)</i> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <i>16</i>	20 19 18 17 <i>(16)</i>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE <u>8</u>	20	19	18	17	16	15	14	13	12	11	10	9	<u>8</u>	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE <u>1</u>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	<u>1</u>	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE <u>6</u> (LB)	Left Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
SCORE <u>6</u> (RB)	Right Bank 10 9					8 7 <u>6</u>					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE <u>5</u> (LB)	Left Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
SCORE <u>5</u> (RB)	Right Bank 10 9					8 7 6					<u>5</u> 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE <u>9</u> (LB)	Left Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					
SCORE <u>9</u> (RB)	Right Bank 10 <u>9</u>					8 7 6					5 4 3					2 1 0					

Total Score 102

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

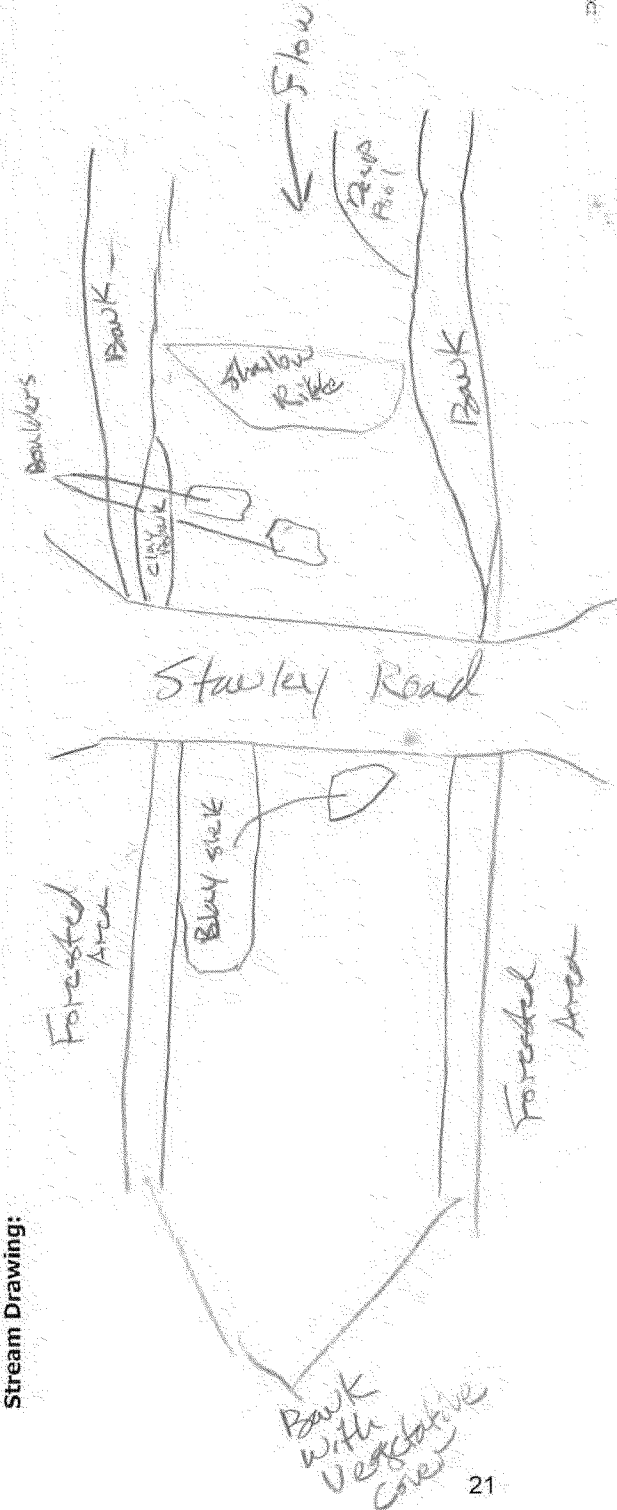
COMMENT _____

A-CANOPY	B-AESTHETICS	C-RECREATION	D-MAINTENANCE	E-ISSUES
<input type="checkbox"/> > 85% - Open <input checked="" type="checkbox"/> 55% - < 85% <input type="checkbox"/> 30% - < 55% <input type="checkbox"/> 10% - < 30% <input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Nuisance algae <input type="checkbox"/> Invasive macrophytes <input checked="" type="checkbox"/> Excess turbidity <input type="checkbox"/> Discoloration <input checked="" type="checkbox"/> Foam/Scum	<input type="checkbox"/> Oil sheen <input checked="" type="checkbox"/> Trash/Litter <input checked="" type="checkbox"/> Nuisance odor <input checked="" type="checkbox"/> Sludge deposits <input type="checkbox"/> CSOs/SSOs/Outfalls	<input type="checkbox"/> Public <input type="checkbox"/> Active <input type="checkbox"/> Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old <input type="checkbox"/> Spray <input type="checkbox"/> Islands <input checked="" type="checkbox"/> Scoured <input type="checkbox"/> Snag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified <input type="checkbox"/> Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks <input type="checkbox"/> Relocated <input type="checkbox"/> Outfalls <input type="checkbox"/> Bedload: <input checked="" type="checkbox"/> Moving <input type="checkbox"/> Stable <input type="checkbox"/> Armoured <input type="checkbox"/> Slumps <input type="checkbox"/> Impounded <input type="checkbox"/> Desiccated <input type="checkbox"/> Flood control <input type="checkbox"/> Drainage	<input type="checkbox"/> WWTP <input type="checkbox"/> CSO <input type="checkbox"/> NPDES <input type="checkbox"/> Industry <input type="checkbox"/> Urban <input type="checkbox"/> Hardened <input type="checkbox"/> Dirt & Grime <input type="checkbox"/> Contaminated <input type="checkbox"/> Landfill <input type="checkbox"/> BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment <input type="checkbox"/> Logging <input type="checkbox"/> Irrigation <input type="checkbox"/> Cooling <input type="checkbox"/> Erosion: <input type="checkbox"/> Bank <input type="checkbox"/> Surface <input type="checkbox"/> False bank <input type="checkbox"/> Mature <input type="checkbox"/> Lagoon <input type="checkbox"/> Wash H ₂ O <input type="checkbox"/> Tile <input type="checkbox"/> H ₂ O Table <input type="checkbox"/> Mines: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry <input type="checkbox"/> Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant <input type="checkbox"/> Wetland <input type="checkbox"/> Park <input type="checkbox"/> Golf <input type="checkbox"/> Lawn <input type="checkbox"/> Home <input type="checkbox"/> Atmospheric deposition

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent.

% open	Left	Middle	Right	Total Average
	XX	XX	XX	

Stream Drawing:



IDEN 07/06/10

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

See Attached

STREAM NAME		LOCATION <u>AS 6 (North) → ACTUALLY AS5</u>	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ PM	REASON FOR SURVEY

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover: mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE <u>4</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 <u>4</u> 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE <u>7</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material; increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE <u>10</u>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE <u>16</u>	20 19 18 17 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Parameters to be evaluated in sampling reach

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE /	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE 4 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE 8 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE 9 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 9 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

Total Score 96

Multi-habitat (MHAB) Macroinvertebrate Collection Procedure S-001-OWQ-W-BS-10-T-R0

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (front)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)							
IDEM	Sample #	bioSample #	Stream Name	Location			
	AS-6		Pigeon Creek	38.06617, -87.30379			
IDEM	Surveyor	Sample Date	County	Macro Sample Type	Habitat Complete	QHEI Score: 52	
	Go Tech	8/22/17	Warwick	MHAB, Fish			
1] SUBSTRATE Check ONLY Two predominant substrate TYPE BOXES; estimate % and check every type present. Check ONE (Or 2 & average)							
BEST TYPES		OTHER TYPES		ORIGIN		QUALITY	
PREDOMINANT P R <input type="checkbox"/> BLDR/SLABS [10] <input type="checkbox"/> BOULDER [9] <input type="checkbox"/> COBBLE [8] <input type="checkbox"/> GRAVEL [7] <input type="checkbox"/> SAND [6] <input type="checkbox"/> BEDROCK [5]	PRESENT TOTAL % P R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	PREDOMINANT P R <input type="checkbox"/> HARDPAN [4] <input type="checkbox"/> DETRITUS [3] <input type="checkbox"/> MUCK [2] <input type="checkbox"/> SILT [2] <input type="checkbox"/> ARTIFICIAL [0]	PRESENT TOTAL % P R <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> LIMESTONE [1] <input type="checkbox"/> TILLS [1] <input type="checkbox"/> WETLANDS [0] <input type="checkbox"/> HARDPAN [0] <input type="checkbox"/> SANDSTONE [0] <input type="checkbox"/> RIP/RAP [0] <input type="checkbox"/> LACUSTRINE [0] <input type="checkbox"/> SHALE [-1] <input type="checkbox"/> COAL FINES [-2]	S I T T <input type="checkbox"/> HEAVY [-2] <input type="checkbox"/> MODERATE [-1] <input type="checkbox"/> NORMAL [0] <input type="checkbox"/> FREE [1]	Substrate 6 Maximum 20	
NUMBER OF BEST TYPES: <input type="checkbox"/> 4 or more [2] sludge from point-sources <input type="checkbox"/> 3 or less [0]							
Comments							
2] INSTREAM COVER Indicate presence 0 to 3 and estimate percent: 0-Absent; 1-Very small amounts or if more common of marginal quality; 2-Moderate amounts, but not of highest quality or in small amounts of highest quality; 3-Highest quality in moderate or greater amounts (e.g., very large boulders in deep or fast water, large diameter log that is stable, well developed root wad in deep/fast water, or deep, well-defined, functional pools.)							
% Amount <input type="checkbox"/> UNDERCUT BANKS [1] <input type="checkbox"/> OVERHANGING VEGETATION [1] <input type="checkbox"/> SHALLOWS (IN SLOW WATER) [1] <input type="checkbox"/> ROOTMATS [1]		% Amount <input type="checkbox"/> POOLS > 70cm [2] <input type="checkbox"/> ROOTWADS [2] <input type="checkbox"/> BOULDERS [1]		% Amount <input type="checkbox"/> OXBOWS, BACKWATERS [1] <input type="checkbox"/> AQUATIC MACROPHYTES [1] <input type="checkbox"/> LOGS OR WOODY DEBRIS [1]		Check ONE (Or 2 & average) <input type="checkbox"/> EXTENSIVE > 75% [11] <input type="checkbox"/> MODERATE 25-75% [7] <input type="checkbox"/> SPARSE 5-25% [3] <input type="checkbox"/> NEARLY ABSENT < 5% [1]	
				Cover Maximum 20 8			
Comments							
3] CHANNEL MORPHOLOGY Check ONE in each category (Or 2 & average)							
SINOUSITY <input type="checkbox"/> HIGH [4] <input type="checkbox"/> MODERATE [3] <input type="checkbox"/> LOW [2] <input checked="" type="checkbox"/> NONE [1]		DEVELOPMENT <input type="checkbox"/> EXCELLENT [7] <input type="checkbox"/> GOOD [5] <input type="checkbox"/> FAIR [3] <input checked="" type="checkbox"/> POOR [1]		CHANNELIZATION <input type="checkbox"/> NONE [6] <input checked="" type="checkbox"/> RECOVERED [4] <input type="checkbox"/> RECOVERING [3] <input type="checkbox"/> RECENT OR NO RECOVERY [1]		STABILITY <input type="checkbox"/> HIGH [3] <input type="checkbox"/> MODERATE [2] <input checked="" type="checkbox"/> LOW [1]	
				Channel Maximum 20 7			
Comments							
4] BANK EROSION AND RIPARIAN ZONE Check ONE in each category for EACH BANK (Or 2 per bank & average)							
River right looking downstream L R <input checked="" type="checkbox"/> EROSION <input type="checkbox"/> NONE/LITTLE [3] <input type="checkbox"/> MODERATE [2] <input type="checkbox"/> HEAVY/SEVERE [1]		L R <input checked="" type="checkbox"/> RIPARIAN ZONE WIDTH <input type="checkbox"/> WIDE > 50m [4] <input type="checkbox"/> MODERATE 10-50m [3] <input type="checkbox"/> NARROW 5-10m [2] <input type="checkbox"/> VERY NARROW [1] <input type="checkbox"/> NONE [0]		L R <input checked="" type="checkbox"/> FLOOD PLAIN QUALITY <input type="checkbox"/> FOREST, SWAMP [3] <input type="checkbox"/> SHRUB OR OLD FIELD [2] <input type="checkbox"/> RESIDENTIAL, PARK, NEW FIELD [1] <input type="checkbox"/> FENCED PASTURE [1] <input type="checkbox"/> OPEN PASTURE, ROWCROP [0]		L R <input type="checkbox"/> CONSERVATION TILLAGE [1] <input type="checkbox"/> URBAN OR INDUSTRIAL [0] <input type="checkbox"/> MINING / CONSTRUCTION [0]	
				Indicate predominant land use(s) past 100m riparian. Riparian Maximum 10 10			
Comments							
5] POOL/GLIDE AND RIFFLE/RUN QUALITY							
MAXIMUM DEPTH Check ONE (ONLY!) <input checked="" type="checkbox"/> > 1m [6] <input type="checkbox"/> 0.7- < 1m [4] <input type="checkbox"/> 0.4- < 0.7m [2] <input type="checkbox"/> 0.2- < 0.4m [1] <input type="checkbox"/> < 0.2m [0]		CHANNEL WIDTH Check ONE (Or 2 & average) <input checked="" type="checkbox"/> POOL WIDTH > RIFFLE WIDTH [2] <input type="checkbox"/> POOL WIDTH = RIFFLE WIDTH [1] <input type="checkbox"/> POOL WIDTH < RIFFLE WIDTH [0]		CURRENT VELOCITY Check ALL that apply <input type="checkbox"/> TORRENTIAL [-1] <input type="checkbox"/> VERY FAST [1] <input type="checkbox"/> FAST [1] <input type="checkbox"/> MODERATE [1]		Recreation Potential (Circle one and comment on back) <input type="checkbox"/> Primary Contact <input type="checkbox"/> Secondary Contact Pool/ Current Maximum 12 9	
Comments							
Indicate for functional riffles; Best areas must be large enough to support a population of riffle-obligate species:							
RIFFLE DEPTH <input type="checkbox"/> BEST AREAS > 10cm [2] <input type="checkbox"/> BEST AREAS 5-10cm [1] <input checked="" type="checkbox"/> BEST AREAS < 5cm [metric = 0]		RUN DEPTH <input checked="" type="checkbox"/> MAXIMUM > 50cm [2] <input type="checkbox"/> MAXIMUM < 50cm [1]		RIFFLE/RUN SUBSTRATE <input type="checkbox"/> STABLE (e.g., Cobble, Boulder) [2] <input type="checkbox"/> MOD. STABLE (e.g., Large Gravel) [1] <input checked="" type="checkbox"/> UNSTABLE (e.g., Fine Gravel, Sand) [0]		RIFFLE/RUN EMBEDDEDNESS <input checked="" type="checkbox"/> NONE [2] <input type="checkbox"/> LOW [1] <input type="checkbox"/> MODERATE [0] <input type="checkbox"/> EXTENSIVE [-1]	
				Riffle/ Run Maximum 8 4			
Comments							
6] GRADIENT (2.64 ft/mi) <input type="checkbox"/> VERY LOW - LOW [2-4] <input checked="" type="checkbox"/> MODERATE [6-10] <input type="checkbox"/> HIGH - VERY HIGH [10-6]							
DRAINAGE AREA (22.5 mi ²)		% POOL: 70 % GLIDE: 30 % RUN: X % RIFFLE: X		Gradient Maximum 10 8			

IDEM 07/08/10

Appendix 10.4 Blank OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index) form (back)

OWQ Biological Studies QHEI (Qualitative Habitat Evaluation Index)

COMMENT _____

A-CANOPY		B-AESTHETICS		C-RECREATION		D-MAINTENANCE		E-ISSUES	
<input type="checkbox"/> > 85% - Open	<input type="checkbox"/> Nuisance algae	<input type="checkbox"/> Oil sheen	<input type="checkbox"/> Area	<input type="checkbox"/> Depth	<input type="checkbox"/> Public	<input type="checkbox"/> Private	<input type="checkbox"/> WWTP	<input type="checkbox"/> CSO	<input type="checkbox"/> NPDES
<input type="checkbox"/> 55% - < 85%	<input type="checkbox"/> Invasive macrophytes	<input checked="" type="checkbox"/> Trash/Litter	<input type="checkbox"/> > 100 ft ²	<input type="checkbox"/> > 3 ft	<input type="checkbox"/> Active	<input type="checkbox"/> Historic	<input type="checkbox"/> Industry	<input type="checkbox"/> Urban	
<input type="checkbox"/> 30% - < 55%	<input checked="" type="checkbox"/> Excess turbidity	<input type="checkbox"/> Nuisance odor			Succession: <input type="checkbox"/> Young <input type="checkbox"/> Old		<input type="checkbox"/> Hardened	<input type="checkbox"/> Dirt & Grime	
<input checked="" type="checkbox"/> 10% - < 30%	<input type="checkbox"/> Discoloration	<input type="checkbox"/> Sludge deposits			<input type="checkbox"/> Spray	<input type="checkbox"/> Islands	<input type="checkbox"/> Contaminated	<input type="checkbox"/> Landfill	
<input type="checkbox"/> < 10% - Closed	<input type="checkbox"/> Foam/Scum	<input type="checkbox"/> CSOs/SSOs/Outfalls			Sneag: <input type="checkbox"/> Removed <input type="checkbox"/> Modified		<input type="checkbox"/> BMPs: <input type="checkbox"/> Construction <input type="checkbox"/> Sediment		
					Leveed: <input type="checkbox"/> One-sided <input type="checkbox"/> Both banks		<input type="checkbox"/> Logging	<input type="checkbox"/> Irrigation	<input type="checkbox"/> Cooling
					<input type="checkbox"/> Relocated	<input type="checkbox"/> Outfalls	<input type="checkbox"/> Erosion: <input type="checkbox"/> Bank	<input type="checkbox"/> Surface	
					Bedload: <input type="checkbox"/> Moving <input type="checkbox"/> Stable		<input type="checkbox"/> False bank	<input type="checkbox"/> Manure	<input type="checkbox"/> Lagoon
					<input type="checkbox"/> Armoured	<input type="checkbox"/> Stumps	<input type="checkbox"/> Wash H ₂ O	<input type="checkbox"/> Tile	<input type="checkbox"/> H ₂ O Table
					<input type="checkbox"/> Impounded	<input type="checkbox"/> Desiccated	Mine: <input type="checkbox"/> Acid <input type="checkbox"/> Quarry		
					Flood control <input type="checkbox"/> Drainage		Flow: <input type="checkbox"/> Natural <input type="checkbox"/> Stagnant		
							<input type="checkbox"/> Wetland	<input type="checkbox"/> Park	<input type="checkbox"/> Golf
							<input type="checkbox"/> Lawn	<input type="checkbox"/> Home	
							<input type="checkbox"/> Atmospheric deposition		

Looking upstream (> 10m, 3 readings; < 10m, 1 reading in middle); Round to the nearest whole percent

Left	Middle	Right	Total Average
% open _____	% _____	% _____	% _____

Stream Drawing: AS6



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

A56
(5/24/2018)

STREAM NAME		LOCATION	
STATION #	REACH ID#	STREAM CLASS	
UTM N	UTM E	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE TIME _____ PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 4	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 7	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 9	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 10	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 16	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present; usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE <u>6</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE <u>1</u>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 <u>1</u> 0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE <u>7</u> (LB)	Left Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
SCORE <u>7</u> (RB)	Right Bank 10 <u>9</u>	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE <u>8</u> (LB)	Left Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
SCORE <u>8</u> (RB)	Right Bank 10 9	<u>8</u> 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE <u>10</u> (LB)	Left Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0
SCORE <u>10</u> (RB)	Right Bank <u>10</u> 9	8 7 6	5 4 3	2 1 0

Total Score 107

APPENDIX C.

RAW DATA-WATER CHEMISTRY, MACROINVERTEBRATES, FISH



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-01
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-1

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	313 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.16 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-02
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-2

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	280 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-03
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-3

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	256 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	11.7 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-05
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-6

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	255 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	0.18 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	23.0 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by



1125 E. Walnut Street
Boonville, IN 47601

Eco-Tech Consultants, Inc.
311 Clark Station Road
Fisherville, KY 40023

Lab Number: 2017-0199-04
Date Received: 8/29/2017
Date Reported: 9/8/2017

Sample Identification

AS-5

Date Sampled: 8/29/2017
Time Sampled:
Sampled by: ***

Sample Analysis

Parameter	Result	Method	Analyst	Analysis Date/Time
Acidity as CaCO ₃	<10 mg/L	SM 2310 B-1997	CRB	9/1/2017 8:31
Alkalinity as CaCO ₃	344 mg/L	SM 2320 B-1997	CRB	9/1/2017 8:31
Iron	<0.1 mg/L	SM 3500 FE-1997 / Hach 8008	MJL	9/7/2017 13:00
Metals Analysis Preparation	Completed	EPA 200.7 Rev. 4.4	CRB	9/5/2017 9:10
Manganese	<0.1 mg/L	SM 3500 MN-B-1999 / Hach 8034	MJL	9/7/2017 15:10
Solids, Total Suspended	<10 mg/L	SM 2540 D-1997	CVB	9/1/2017 8:45

*** Performed by client

Reviewed by

Raw Macroinvertebrate data collected 8/28-29/2017 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

AQUATIC SITE				AS1	AS2	AS3	AS5	AS6
DATE				8/29/17	8/29/17	8/29/17	8/28/17	8/29/17
SPECIES	T.V.	F.F.G.	Habit					
PLATYHELMINTHES								
Turbellaria								
Tricladida								
Planariidae								
<i>Girardia (Dugesia) tigrina</i>					1			
MOLLUSCA								
Bivalvia								
Veneroida								
Corbiculidae								
<i>Corbicula fluminea</i>	6	FC		8				6
Gastropoda								
Basommatophora								
Physidae								
<i>Physella sp.</i>	8	SC		1		1		
ANNELIDA								
Oligochaeta	8	GC	bu					
Clitellata								
Tubificida								
Naididae								
Naidinae								
<i>Nais pardalis</i>	8	GC			1			
Tubificinae w.o.h.c.	10	GC	bu	1	1		3	
Pristininae								
<i>Pristina sp.</i>	8	GC			1			
<i>Pristina aequiseta</i>	8	GC			3			
Rhyacodrilinae								
<i>Branchiura sowerbyi</i>	6	GC	bu		3		1	
ARTHROPODA								
Arachnoidea								
Acariformes								
Oribatei								
							1	
Crustacea								
Amphipoda								
Talitridae								
<i>Hyalella azteca</i>	8	GC	cr	5		6		9

Asellidae								
<i>Caecidotea sp.</i>	8	GC	cr	2				
Insecta								
Collembola								
Sminthuridae								1
Ephemeroptera								
Baetidae								
<i>Callibaetis floridanus</i>		GC		3		10	1	3
Caenidae								
<i>Caenis sp.</i>	3	GC	sw		4		1	
Odonata								
Calopterygidae								
<i>Calopteryx sp.</i>	4	PR						2
<i>Hetaerina sp.</i>	3	PR					1	
Coenagrionidae							1	
<i>Argia sp.</i>	5	PR		1	4	3		1
<i>Enallagma sp.</i>	9	PR		2	1	6	1	1
<i>Ischnura sp.</i>	9	PR	cb	2	1	4		1
Corduliidae								
<i>Epitheca princeps</i>		PR	sp			2		
<i>Macromia sp.</i>	2	PR		1				
Libellulidae				1		1		
<i>Erythemis sp.</i>	2	PR		2				
<i>Libellula sp.</i>	9	PR						1
<i>Pachydiplax longipennis</i>		PR						3
Heteroptera								
Belostomatidae		PR		2				
Gerridae		PR						
<i>Aquarius</i>		PR	sw			1		
Nepidae								
<i>Ranatra sp.</i>		PR				3		
Megaloptera								
Corydalidae								
<i>Corydalus cornutus</i>	2	PR		3			1	
Trichoptera								
Hydropsychidae							4	4
<i>Hydropsyche sp.</i>	4	FC	cn	10	1	1	9	4
<i>Cheumatopsyche sp.</i>	3	FC	cn	57	87		79	20
Hydroptilidae								
<i>Hydroptila sp.</i>	3	SC	cn				6	2
<i>Neotrichia sp.</i>	4	SC					4	
Polycentropodidae								
<i>Neureclipsis sp.</i>	3	FC		1			1	

Coleoptera								
Dytiscidae		PR				1		
Elmidae								
<i>Stenelmis sp.</i>	5	SC	cn			1		
Gyrinidae								
<i>Dineutus sp.</i>	4	PR		2				8
Halipilidae								
<i>Peltodytes sp.</i>	7	SH	cb				1	1
Hydrophilidae								
<i>Berosus sp.</i>	7	PR		1			2	
Diptera								
Chaoboridae								
<i>Chaoborus punctipennis</i>						1		
Chironomidae	6	FC				1		
Chironominae								
Chironomini								
<i>Chironomus sp.</i>	8	GC	bu	1		1	59	
<i>Cryptochironomus sp.</i>	5	PR	sp			1	7	1
<i>Cryptotendipes sp.</i>	4	GC	bu			2		
<i>Dicrotendipes</i>								
<i>neomodestus</i>	5	FC		5		12	10	4
<i>Endochironomus sp.</i>	6	SH	cn			1		
<i>Glyptotendipes sp.</i>	6	FC	bu	3	82	1		2
<i>Parachironomus sp.</i>	4	PR	sp		1	1		
<i>Paracladopelma sp.</i>	7	GC					3	
<i>Phaenopsectra obediens</i>								
group		OM				2		
<i>Polypedilum flavum</i>				28	3		3	4
<i>Polypedilum halterale</i>								
group						1		
<i>Polypedilum illinoense</i>								
group	7			23	1	24	133	39
<i>Polypedilum sp.</i>		SH	cb		1			
<i>Tribelos fuscicorne</i>							7	1
<i>Tribelos jucundus</i>								1
Pseudochironomini								
<i>Pseudochironomus sp.</i>							59	
Tanytarsini								
<i>Cladotanytarsus sp.</i>	4	GC	cb	1		1		
<i>Paratanytarsus dissimilis</i>						2		
<i>Rheotanytarsus exiguus</i>								
gp.		FC			11			
<i>Tanytarsus sp.</i>	4	FC	cb	1	3	2	3	6
Orthoclaadiinae								

<i>Corynoneura sp.</i>	4	GC	sp	1			
<i>Cricotopus bicinctus</i>	7	OM		3		14	2
<i>Rheocricotopus robacki</i>	4			1			
<i>Thienemanniella xena</i>	4	GC					2
Tanypodinae							
<i>Ablabesmyia mallochi</i>	5	OM		6	10	3	4
<i>Ablabesmyia rhamphe</i>							
group				9	5		2
<i>Conchapelopia sp.</i>	4	PR		20	5	66	7
<i>Labrundinia sp.</i>	4	PR	sp		1		
<i>Procladius sp.</i>	7	PR	sp	4	8	7	8
<i>Telopelopia okoboji</i>	4			5			
Empididae						1	
<i>Hemerodromia sp.</i>			sp			3	
Muscidae	6	PR				1	
Simuliidae							
<i>Simulium sp.</i>	5	FC	cn		2		

Raw fish data collected 8-29-17 from streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Species	Common Name	AS 1	AS2	AS3	AS5	AS6	Family/Group	IBI Trophic Guild Assignment	IBI Sensitivity	Repro. Guild	Pioneer?	Schooling?
Ameiurus natalis	yellow bullhead		1				Ictaluridae	V	T	C		
Amia calva	bowfin			1			Amiidae	C		C		
Aphredoderus sayanus	pirate perch			1			Aphredoderidae	V		M		
Cyprinella whipplei	steelcolor shiner				11		Cyprinidae	V		M		TRUE
Gambusia affinis	mosquitofish				1	12	Poeciliidae	V		N		
Ictalurus punctatus	channel catfish			1			Ictaluridae	C	T	C		
Lepomis cyanellus	green sunfish	4	5	7	8		Sunfish	V	T	C	TRUE	
Lepomis gulosus	warmouth	2	4	1		1	Sunfish	C		C		
Lepomis macrochirus	bluegill	10	15	3		4	Sunfish	V		C		
Lepomis megalotis	long-eared sunfish	4		3		2	Sunfish	V	SI	C		
Lepisosteus osseus	longnose gar				1		Lepisosteidae	C	T	M		
Micropterus punctulatus	Kentucky bass	1		1	1	1	Centrarchidae	C		C		
Micropterus salmoides	largemouth bass		4				Centrarchidae	C		C		
Percina sciera	dusky darter				1	1	Percidae	V	S	S		
Phenacobius mirabilis	suckermouth minnow	4			20		Cyprinidae	V		S		TRUE
Pimephales notatus	bluntnose minnow	5			7		Cyprinidae	D	T	C	TRUE	TRUE
# individuals		30	29	18	50	21						
# species		7	5	8	8	6						
% deformed		3.33%	3.45%	0.00%	0.00%	0.00%						
Total Individuals							77					

* exotic species

IBI Trophic Guild Assignment = Detritivore-D, Omnivore-O, Invertivore-V, Insectivore-I, Carnivore-C

IBI Sensitivity = Sensitive-S, Intolerant-I, Both Sensitive & Intolerant (SI), Tolerant-T

Reproductive Guild = Simple lithophil-S, Complex with parental care-C, Simple miscellaneous-M, Complex with no parental care-N

APPENDIX D.

DATA TABLES OF PREVIOUS SURVEY EFFORT (2011)-WATER CHEMISTRY,
MACROINVERTEBRATES, FISH

Appendix D Table 1. Stream characteristics at aquatic sample sites within the proposed Seven Hills Mine in Warrick County, Indiana.

Sample Site	Stream	Flow Regime	Bankfull Width (ft)	Mean Bankfull Depth (ft)	Slope	Channel Material	RBP Score	Rosgen Stream Type*
AS1	6	Per	45.1	2.7	0.03	Silt	126	F5/F6
AS2	5	Int	6.5	0.3	0.01	Gravel	47	C6
AS3	11	Per	63	2.6	0.02	Silt	126	F5/F6

*Rosgen 1996

Appendix D Table 2. Physical and chemical measurements of water in streams within the proposed Seven Hills Mine in Warrick County, Indiana as compared to Indiana NPDES discharge standards and Minimum Surface Water Quality standards.

Parameter	AS1	AS2	AS3	NPDES Discharge Limits	Surface Water Quality Standards
Temperature (°C)	17.5	17.5	18.9	≤32.2	≤32.2
Flow Rate (ft/second)	0.72	0.31	1.12	NA	NA
pH	8.3	8.8	8.4	6.0 - 9.0	6.0 - 9.0
Total Dissolved Solids (mg/L)	1588	863	1129	NA	<750
Total Acidity (mg/L as CaCo3)	<10	<10	<10	NA	NA
Total Alkalinity (mg/L as CaCo3)	380	330	280	NA	NA
Total Iron (mg/L)	0.79	0.1	0.47	<6.0	NA
Total Manganese (mg/L)	0.19	0.02	0.066	<4.0	NA
Total Suspended Solids (mg/L)	39	24	25	<70	NA

Appendix D Table 3. Metrics used to calculate the macroinvertebrate Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Taxa	8	1	19	1	18	1
Number of Individuals	26	1	86	1	129	3
Number of EPT Taxa	1	1	1	1	3	1
% Orthocladiinae + Tanytarsini of Chironomidae	0.0%	5	0.0%	5	14.3%	5
% Non-insects Minus Crayfish	5.4%	5	19.8%	3	9.3%	5
Number of Diptera Taxa	1	1	6	1	3	1
% Intolerant	7.7%	1	11.6%	1	39.5%	5
% Tolerant	11.5%	5	14.0%	3	0.8%	5
% Predators	42.3%	5	59.3%	5	20.9%	3
% Shredders + Scrapers	15.4%	3	15.1%	3	31.0%	5
% Collector-Filterers	7.7%	5	11.6%	3	36.4%	1
% Sprawlers	0.0%	1	3.5%	3	0.0%	1
Total Scores		34		30		36

*<36=impaired, >36=unimpaired.

Appendix D Table 4. Fish community metrics used to calculate the Index of Biotic Integrity and resulting scores for streams sampled within the proposed Seven Hills Mine in Warrick County, Indiana.

Parameter	AS1		AS2		AS3	
	Value	Score	Value	Score	Value	Score
Number of Species	13	5	7	1	18	5
Number of Minnow Species	2	3	1	1	5	3
Number of Sunfish Species	5	5	2	3	5	5
Number of Sucker Species	0	1	0	1	0	1
Number of Sensitive Species	0	5	0	1	1	1
% Tolerant	21%	5	50%	3	22%	5
% Omnivore	5%	5	2%	5	4%	5
% Insectivore	84%	5	98%	5	84%	5
% Pioneer	11%	5	NA		NA	
% Carnivore	NA		2%	1	13%	3
Total # Individuals	62	1	148	3	85	1
% Simple Lithophilic Individuals	2%	1	0%	1	1%	1
% Individuals with Deformities	2%	3	1%	5	0%	5
Total Scores		44		30		40
Qualitative Rating*		Fair		Poor		Fair

*58-60=Excellent, 48-52=Good, 40-44=Fair, 28-34=Poor, 12-22=Very Poor, <12=No Fish



United Minerals Company, LLC
 566 Dickeyville Rd
 Lynnville, IN 47619
 812.922.1015

October 18, 2017

Colonel Antoinette Gant
 U.S. Army Corps of Engineers
 Louisville District
 600 Dr. Martin Luther King Place
 Louisville, Kentucky 40202

RE: Modification to Pending Permit Application No. LRL-2013-635-gjd

Dear Colonel Gant:

Previously, we proposed a revised mine plan which significantly reduces wetland impacts at the proposed Seven Hills mine site. This plan includes removing 162 acres of wetlands and 9,445 linear feet from the planned impact area and only requesting "Conditional" approval for future impacts to 140 acres of wetlands and 10,617 linear feet of ephemeral and intermittent streams. Our proposal is for approval to conduct mining operations in the initial area. This will allow Peabody, the Corps and the Indiana Department of Natural Resources (INDNR) to monitor the on-site and off-site mitigation efforts and whether or not significant secondary impacts to the adjacent wetlands are occurring. As you are aware, Peabody has provided engineering and environmental analysis and numerous past mining examples that indicate adjacent negative impacts are not expected; however, if the indirect impacts are significant and/or the mitigation is not being completed as the permit requires the permit "Condition" is not met. As a result, Peabody would not be allowed to continue mining into the 140 acres of wetlands depicted on the attached map. If, on the other hand, the indirect impacts are insignificant and the mitigation is progressing as planned, then the permit "Condition" is met and mining is allowed to continue through the "Conditional" 140 acre wetland area. Peabody will also work with the Corps to develop an effective Adaptive Management Plan (AMP) to outline monitoring and any needed corrective actions.

This modification directly responds to concerns raised by the Corps, USEPA and the U.S. Fish and Wildlife Service including:

- Increasing the undisturbed buffer along the west side of Pigeon Creek. The original plan included a minimum buffer width of approximately 110 feet, which is a typical setback distance from a perennial stream. The minimum buffer width will now be 580 feet. While Pigeon Creek is a straightened, dredged and actively eroding channel, the nearly fivefold increase in buffer width will provide additional protection between the mining area and stream and significant travel and habitat areas for potential wildlife and aquatic species including the Indiana Bat and Copperbelly Water snake. Along with the approved Protection and Enhancement Plans (PEPs) included in the approved Surface Mining

Control and Reclamation Act (SMCRA) permit , this plan modification will provide even greater protections to any species of concern.

- The overall footprint of the mining operation has been decreased. It was mentioned in a meeting with the Louisville District that the project needed to be reduced to a “couple hundred acres” of wetland impacts. It is unclear what this direction is based upon, but it does make the initial wetland impact acreage similar to wet land impacts approved through Environmental Assessments and mitigated FONSI's at Bear Run (235 acres of wetland impacts) and Wild Boar (145 acres of wetland impacts). This modification achieves the balance of minimizing the impact while allowing production of an important and valuable energy resource. Unfortunately, the reduced impact area results in an additional 3 million tons of high quality coal remaining in the ground . Nevertheless, a safe and efficient mine can still occur, albeit at a reduced annual production rate.

The stream and wetland impact reductions are shown below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Wetland Quality

Given you only recently assumed command over the Louisville District, the following summary of the wetland characteristics of the planned impact site are provided to refute incorrect claims of the wetlands being special and unique.

- There are no special or unique trees. In fact, the tree species are typical of southwestern Indiana forested wetlands, according to a review by a professional forester. Logging has occurred on multiple occasions. Please note many of the tree species present on the site are not allowed to be planted for mitigation purposes in the Louisville District, due to the less desirable non-hardwood species.
- Nearly 80% of the wetlands planned for impacts were previously farmed with conventional agricultural methods. The wetlands developed by simply ceasing to farm over time, likely due to increasing beaver activity.

- There is infrequent overbank flooding (3 -7 days per year on average) into the wetlands from Pigeon Creek. In addition, the channel connections from the wetlands into Pigeon Creek are actively eroding and head cutting further into the wetlands.
- The modified plan results in impacts to only 2.1% of the wetlands in the Highland – Pigeon Watershed. The Seven Hills wetlands are not a significant portion of the wetlands in the watershed and the wetland acreages will increase with the additional mitigation proposed in this plan.
- Pigeon Creek is a straightened, eroding, low quality stream. Aquatic life sampling indicates values are rated “fair”. This is similar to what is found in agricultural areas in southern Indiana
- The Hydrogeomorphic (HGM) analysis shows the wetlands can be fully mitigated with an approximate 2:1 mitigation ratio. HGM does not indicate the Seven Hills wetlands are special or unique, it is only a relative measure compared to wetlands in western Kentucky that were used as a reference. Again, these wetlands mostly developed by ceasing farming activities. If a special and unique wetland is present in the area, the Patoka River wetlands located approximately 15 miles north of Seven Hills may be an example. This multi-thousand acre wetland complex is diverse and much more valuable than the Seven Hills wetlands.

Mitigation

Peabody is proposing on-site mitigation/minimization at a ratio of 1:1, off-site mitigation at a ratio of 1.5:1 and many additional enhancements which are quantified in the table below. The Greathouse Island property located adjacent to the Wabash River was previously proposed for mitigation; however, the surprisingly low credit values the Corps was willing to grant for this property caused Peabody to drop the option it had to purchase this property. The option was held for 5 years and nearly \$400,000 was invested on what was and is still believed to be a very high potential mitigation property. We have recently requested guidance on mitigation credits for properties within the Highland -Pigeon watershed and in adjacent watersheds, yet the Louisville District has not provided any clear guidance on the potential mitigation value for these properties. The acquisition of such properties is time consuming and there are other entities competing to acquire these properties. The inability to gain a clear understanding of the mitigation value that the Corps will grant puts Peabody in a competitive disadvantage and leads to missed opportunities and wasted time and resources. This is especially frustrating and confusing, when the Louisville District suggested earlier this year, that we contact the Patoka National Wildlife Refuge manager about potential mitigation properties in the Refuge target area that would be desirable mitigation properties for Seven Hills. Further, site visits were made with Louisville District personnel and favorable verbal opinions were given on the value of one property that Peabody has the potential to

acquire. Peabody renews its request to obtain clear guidance on potential mitigation values of properties that it brings forward, so it has a fair opportunity to obtain these properties and not waste valuable time and resources similar to the Greathouse Island example.

Considering the reluctance to engage on specific mitigation, Peabody is proposing the following conceptual mitigation plan. This plan can be finalized with site specific data following agreement on the requirement and appropriate feedback on mitigation values of proposed properties.

- Peabody will provide a 2.5:1 wetland mitigation ratio consisting of 1:1 acres on-site and 1.5:1 acres off-site. The HGM process which the Corps and EPA requested Peabody to use in the spring of this year, indicates an approximate 2: 1 mitigation ratio fully mitigates the planned site impacts. This is consistent with the HGM assessment completed at this site initially in 2007. The HGM process has not been utilized previously for other Peabody permits in the Louisville District and it appears to provide a much better and transparent method of calculating wetland mitigation needs than the ambiguous methods employed in the past.
 - Regarding the off-site mitigation, Peabody commits to providing 1:1 acreage in the Highland – Pigeon watershed. At a minimum, this will fully mitigate the site impacts in the same watershed. When other mitigation enhancements are considered as described below, the actual mitigation ratio is increased further. It is important to note the off-site mitigation will not only create additional wetlands, but it will also reduce conventional agriculture activities as this acreage will consist of converting current croplands to wetlands.
 - Peabody will provide approximately 0.5:1 mitigation in the Highland – Pigeon or adjacent watersheds. Please note the adjacent watersheds in southwest Indiana are very similar in watershed impacts and needed improvements as there is a prevalence of conventional agricultural activities occurring in the region.
 - Peabody will complete the mitigation as a mix of forested, scrub/shrub and emergent wetlands in a manner representative of the impact site or complete all of the mitigation as a forested wetland. Forested wetlands have been considered to be of higher value by the Louisville District to date.
 - Peabody will utilize high value hardwood tree species on both the on-site and off-site mitigation areas. Please note the Louisville District has not allowed Peabody to plant many of the existing tree species currently present at the site.
 - Peabody will add intentional diversity (pools, roughness, etc.) into the topography to enhance the site.

- Peabody will lower elevations of previously reclaimed areas on the east side of Pigeon Creek to create additional wetlands that will receive more overbank flow from Pigeon Creek and provide additional flood storage and flood water treatment. This issue was deemed very important to the US Fish and Wildlife Service and also serves to create additional habitat for many local species. Please note this work will be completed in advance of mining operations as part of the work is also needed for the flood control purposes during mining. This area will remain in its current state and the floodplain will not be expanded if the mining project is not allowed.
- Peabody will repair existing drainages and install appropriate stabilizing and habitat enhancing structures in the avoidance areas between the mining area and Pigeon Creek. These drainages are currently actively eroding and head cutting through the wetlands. If this project does not move forward, these drainages will continue eroding and will degrade the wetlands over time. Peabody will also restore impacted intermittent drainages at a 1:1 mitigation ratio with appropriate natural stream construction enhancements.
- At the completion of mining, Peabody will remove the “levee” along the west side of Pigeon Creek in strategic locations to improve the connectivity and over bank flooding of the creek into the wetlands. If the mining project does not occur, this improvement will not occur.
- Peabody will incorporate Copperbelly watersnake (CWS) habitat into its mitigation plan along Pigeon Creek to address U.S. Fish and Wildlife Service concerns. These efforts have proven to be successful at previous mining locations, including the Columbia Mine which has been added to the Patoka National Wildlife Refuge. Also, please note one of the recent potential mitigation properties submitted to the Corps for a mitigation value determination is in the Patoka River watershed and within the Refuge target acquisition area and is considered Core Habitat for the CWS. The Refuge has been unable to acquire this property; however, the property could be acquired and used as mitigation for this property, if the mitigation values were known and valued correctly.
- Peabody will conduct upstream and downstream sampling for Nutrients before, during and after mining. No impacts are expected regarding Nutrients; however, the sampling can confirm this and will address a concern from U.S. EPA.
- Peabody will place a Conservation Easement on a 20 acre forested wetland in the Pigeon Creek watershed, located approximately 3 miles south of the mining area. An Indiana Bat roost tree was identified on this tract in a 2008 Indiana Bat survey and the tract contains numerous trees with sloughing bark which is ideal roost tree habitat. This tract is currently not included in a permit and not subject to the Protection and Enhancement Plans (PEPs); therefore, timber cutting could occur at any time. Peabody intentionally acquired this

property for this purpose and will likely sell it, if appropriate credit is not given. This area will be protected in perpetuity if the mining project occurs.

- As mentioned previously, a minimum buffer width of 580 feet will be in place between the mining area and Pigeon Creek. The buffer is up to 800 feet wide in some stretches. This area will be protected with a conservation easement that will prevent future timber cutting. This protection will not be in place if the mining project is not approved.
- Peabody owns additional properties in the Pigeon Creek corridor which it is willing to consider site protection instruments on if appropriate mitigation credit is provided.

Given the direct mitigation acreage and enhancements listed above, Peabody believes the wetland mitigation value for the initial 207 acres of wetland impacts is outlined in the table below.

Mitigation Activity	Acreage	Mitigation Credit Factor	Total Credit
On-site mitigation	207	1	207
On-site Protection	207	0.2	41
Off-site mitigation	311	1	311
Off-site Protection	311	0.15	47
Removal of active cropland by conversion to wetlands	311	0.1	31
Preferred hardwood tree species	518	0.05	26
Stabilize and repair drainages, remove levee and add CWS habitat in avoidance/buffer area	219	0.1	22
Protection of avoidance/buffer area	219	0.2	44
Protection of 20 acre property for Indiana Bat roosting habitat	20	0.25	5
Total Credits			734

The total projected mitigation value outlined above is a significant improvement for the Highland Pigeon watershed in that it increases the acreage of wetlands by minimum of 207 acres, provides protection of existing forested wetlands that could otherwise be lawfully harvested for timber, provides additional habitat for terrestrial and aquatic species and provides an increase in floodplain acreage and usage. These watershed improvements will not occur if the mining project does not occur. An additional 104 acres of wetlands will be created in the Highland-Pigeon or adjacent watershed. The 734 mitigation credit outlined above equate to an effective mitigation ratio of 3.5:1. This is a 75% increase in mitigation above what the HGM analysis indicates is needed to fully mitigate planned impacts. Upon approval of the permit "condition", the same mitigation plan is proposed to be applied to the additional wetland impacts.

This project is very important to Peabody's Midwest operations and workforce and we are hopeful that any remaining issues can be resolved promptly. Upon agreement of the plan modification, Peabody will move forward to revise all applicable parts of the application. If you have any questions or comments, I can be reached by email at Bwest@peabodyenergy.com or at 812-455-278.

Sincerely,

Bryce West
Vice President Environmental Services

Enclosures

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Advogados

September 06, 2017

Colonel Antoinette Gant
District Commander
U.S. Army Corps of Engineers
Louisville District
600 Dr. Martin Luther King Place
Louisville, Kentucky 40202

Via Email

United Minerals Company, LLC
Department of Army (DA) Permit Application
Seven Hills Mine
Warrick County, Indiana
Project Number LRL-2013-635-gjd

Dear Colonel Gant,

This letter is written as follow up to the ongoing discussions the Army Corps of Engineers' (the "Corps") Louisville District has been having with representatives of United Minerals Company, LLC ("UMC"), a wholly owned subsidiary of Peabody Energy Corporation ("Peabody"), with respect to the scope of the required National Environmental Policy Act ("NEPA") review in furtherance of the Corps' issuance of a Clean Water Act Section 404 permit for the Seven Hills Mine project near Elberfield, Indiana. UMC appreciates your continued engagement regarding this important permitting matter, including last week's meeting to discuss the status of Corps review of the project and UMC's proposed additional project enhancements and mitigation measures aimed at responding to remaining Corps concerns.

By letter dated October 27, 2016, I outlined for Colonel Beck the legal posture of the Corps' pending Section 404 permit review for the Seven Hills Mine project. It bears repeating that Corps regulations and long established Corps precedent makes clear that an Environmental Assessment ("EA") is the proper and "normally required" process for Corps review of Section 404 permits. See 40 CFR § 230.7(a). The Louisville District has consistently and steadfastly followed this legal mandate in each and every Section 404 permit review requested by coal companies operating in the Illinois Basin. In no cases to date has the Corps determined that potential impacts at a site were so significant as to justify the departure from its normal review process and require an Environmental Impact Statement ("EIS"). In past permit matters, the Corps has certainly deemed appropriate - again, consistent with its regulations, guidance and case law precedent - the implementation of appropriate mitigation measures to reduce anticipated project environmental impacts so as to avoid perceived

Baker McKenzie.

significant harm. Where required, these determinations have been documented in negotiated EAs with Findings of No Significant Impacts (“FONSI”) that impose the necessary limitations and conditions to address Corps concerns consistent with its regulations.

UMC has diligently and constructively followed the path for approval of its Section 404 permit for Seven Hills as clearly set out in the Corps regulations and as followed in permit after permit reviewed and approved by the Louisville District for other similar projects. Candidly, this has not been a necessarily easy process for UMC as the Company has been provided with no real guidance from, or productive engagement by, the Louisville District staff on mitigation requirements deemed acceptable for this project. In the absence of assistance or guidance from the District, UMC has nonetheless continued to propose and repropose additional mine plan revisions and mitigation measures for the Seven Hills Mine project that have further reduced the wetlands impacts by a third (from 510 acres to 348 acres), further reduced stream impacts by twenty percent (from 53,480 feet to 44,395), and avoided altogether adverse impacts to Pigeon Creek while increasing the undisturbed buffer along the Creek five-fold (from 120 feet to 580 feet). Even after the meeting last week, UMC, on its own initiative, proposed the “conditional approval” only of 140 acres of planned wetlands impacts and 9,000 linear feet of stream impacts, giving the Corps the ability to evaluate UMC’s project work, mitigation measures, and extent of indirect impact before allowing mining to proceed in these areas.

UMC is confident that the EA review and proposed mitigated FONSI at Seven Hills fully satisfies its NEPA obligations and requires Corps’ approval of the pending Section 404 permit. The essential character of the Seven Hills project site does not justify the extraordinary departure from Corps precedent required to support a first-of-its-kind mandate to complete an EIS. This was true when UMC proposed its original project plan and is unquestionably correct today after UMC has painstakingly – and with no real effort or support from District staff to find productive solutions – reworked the project and proposed materially more by way of avoidance and mitigation to respond to any and all Corps concerns.

UMC very much wishes to avoid any further legal process or dispute over the pending Section 404 permit application for its important Seven Hills Mine project. UMC believes that it has acted in good faith to develop a project that satisfies its legal obligations to the Corps and requires engagement by the Corps on final permit terms to bring this matter to appropriate resolution. UMC remains at your disposal to discuss any of these issues as you deem useful.

Yours sincerely,



John Watson
Partner

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Cc: Bryce West
Chris Wittenauer

Seven Hills Coal Mine Application

Additional Information Request

- Purpose in this request for additional information
 - Did not provide earlier
 - Needed for legally defensible path forward
 - This is not all that is needed but what has been determined thus far

- Identifying all impacts to “waters of the U.S.”
 - Direct Impacts
 - Noted 5/22/17 avoidance specified in email from B. West (3000’ buffer from 120’ to 250’ = 9 acres and also crossings of Pigeon Creek)
 - Mentioned in previous two meetings but please clarify - Prep plant – where is slurry disposal going and how will it get there?
 - Any impacts associated with that?
 - Flood Plain Excavation – PN vs 6/14/17 submittal (K. Rogers)
 - Appears to be additional impacts to “waters” not accounted for in PN associated with the floodplain excavation proposed
 - How are you getting equipment into floodplain excavation areas?
 - Open Water Impacts – appears to be all Jurisdictional Open Waters - 104 acres
 - Have all the impacts associated with the levee construction been determined including equipment disturbing adjacent wetlands during construction?
 - Indirect Impacts
 - HEC-RAS Model – Only have results of model and not the model – would like to see the whole model
 - Flooding/inundating anything that is not currently impacted by existing conditions is an impact
 - Flood easements – 0.14 ft – flooding increasing more than 0.00 is an impact on aquatic and terrestrial habitat
 - I-64 – increases in elevations past I-64 – is INDOT aware?
 - Would like inundation mapping
 - What is being impacted by the increases in elevation - Old works? Other waters? Terrestrial/ Aquatic impact
 - This Year there was a 200 – 500 yr event – should update model to reflect
 - Levee height may need to be increased
 - Velocity Increases
 - Station 126+44 - 3.44-7.27 (ft/s)
 - Sedimentation
 - Additional Erosion
 - Instability
 - Downstream Impacts
 - Wetlands being bisected onsite by levees or other activities – for example - PSS7, PSS2, PFO1, PSS8, PFO3

- Draw down from 200' pit – Need scientific study – seepage analysis
- Impacts on Pigeon Cr – need cut-off wall – could “drain” Pigeon Cr
 - Corps does not allow pits on landward side of levees
 - Mentioned in 9 June email K. Rogers attachment – “We don’t expect a blanket of sand based on the soils and the borings from the site. This doesn’t mean that there wouldn’t be small discontinuous layers of sand sparsely present.”
- Riverward side/ West Bank of Levee – increased velocities and inundation
- High Pt Potential Mining – butts up to avoided areas – any impacts to avoided areas from this proposal?
- Levee Construction – Corps would expect -
 - Key way 6’ deep entire width; 95% compaction; ASTM D 698 cohesive soils; 8” lifts; biodegradable geotextile fabric
 - Pipe through levee – Critical issue – need special construction methods and construction experts for this type of activity
 - Height of levee – 1 foot of freeboard
 - In SMCRA application – indication that there is a 25 foot wide open channel – primary spillway - from sediment basins cutting through the levees to the river.
- Operational Questions and concerns that may result in identifying additional impacts
 - Material disposal in lakes – how are you doing that – just pushing? Scooping and dumping ...?
 - Levee construction
 - Are you removing the levee keyway when you remove the levees?
 - How do you get equipment into Phase III and IV?
 - Also HEC-RAS model indicates Phase I & II are removed before Phase III and Phase III is removed before Phase IV; Need to ensure HEC-RAS model is designed to model this plan correctly
 - Removal levee and potential erosion from increases in velocities and destabilization as remove Phase I and II levees and then Phase III levee

Once all the Direct and Indirect Impacts are determined, then the Alternatives analysis can begin – We need to know all the impacts before we can “compare.”

- LEDPA – Once we determine total impacts – both direct and indirect – can do a LEDPA analysis
 - We have not “agreed” on the Project purpose
 - Basic Project Purpose – Mine Coal – Non-water dependent activity – In accordance with 404b1 Guidelines - Presume that there are alternatives that do not involve impacts to special aquatic sites – 510 acres of wetlands.
 - Defining Overall Project Purpose is the responsibility of the Corps – however, the applicant’s needs must be considered in the context of the desired geographic area and the type of project being proposed
 - Mine Coal in the Illinois Basin? State of Indiana? Pigeon Cr watershed?
 - Larger the Impact the more robust the analysis should be – 40 CFR 230.10 “the compliance evaluation procedures will vary to reflect the seriousness of the potential

for adverse impacts on the aquatic ecosystems posed by specific dredge or fill material discharge activities.”

- Does not always mean best economic benefit for the applicant
- Mitigation –
 - Since 1 July 2007 authorized impacts to 1,743,046 ft of stream (321.9 miles); 506.6 acres of wetland impacts and 1367 acres of open water impact to Peabody and its subsidiaries; Mitigation released so far 30 acres of off-site wetland mitigation.
 - Did not spend much time reviewing proposed mitigation – we are not there.
 - Cross-section/swell – “fluff” – reclamation plan map 30’ – 40’ higher than currently
 - Discussion on swell of spoil material
- Cumulative Impacts
 - More thorough Cumulative Analysis is required for 8 digit HUC
 - 2012 – 2014 – 3 yrs of data for the entire country – related to coal mining authorizations
 - Total wetland impacts – 1017 acres
 - Broken down by state – not one state for the 3 year period total is equal to or greater than the proposed 510 acre impact
 - Most in any county in the country for that total 3 year period is 147.5 acres
 - Warrick County, IN was fourth on the list at 105.8 acres.
 - Stream impacts – Indiana had more authorized stream impacts then anywhere in the country – almost twice as many stream impacts as the next closest State – Texas
 - Add IL Basin stream impact numbers and it is more than half of the impacts in the entire country
 - 2007 – 2017 IL Basin
 - Total wetland impact – 1196 acres – Peabody 507 acres
 - Streams 3,769,00 – Peabody 1, 743,000 lft
 - 14 June 2017 letter from Baker McKenzie – “UMC intends to develop all of its available reserves” – reasonable foreseeable impacts

I did not discuss this last item at the meeting because I was under the impression that you all were working on it already based on the letter we received from you all dated June 14, 2017. This is re-written slightly to better explain the request. Also this is more than what is requested above with regard to direct and indirect impacts to "waters of the U.S."

Provide a robust assessment of the direct and indirect impacts to aquatic, avian, and terrestrial species that utilize the site in supporting various aspects of their life cycle. This may include, but is not necessarily limited to nursery refuge, habitat, and food web support. A more comprehensive discussion/inventory is needed on what species are present on the site, both listed species (federal and state) and not listed species, whether they are present permanently or utilize the site temporarily. How would the mining affect these communities locally and further off-site?

Seven Hills (ID No. LRL-2013-00635-gjd) Permit Application Modification Summary (Oct 18, 2017)

Avoidance and Minimization:

- In addition to the 510 acres already designated as avoidance, Peabody is modifying the mining plan to avoid impacting an additional 162 acres of wetlands and 9,445 linear feet of streams in the Seven Hills mining area. This change results in an additional 3 million tons of high quality coal that will not be mined. The resulting buffer between Pigeon Creek and the mining area is increased from a minimum of 110 feet to a minimum of 580 feet and is 800 feet wide in many areas. Peabody is also proposing to include 141 acres of wetlands in a “Conditional” area where approval to mine will not be granted unless Peabody is meeting its permit mitigation obligations and secondary impacts to adjacent wetlands are minimal, as expected. The initial mining area Peabody is seeking approval for includes 207 acres of wetlands and 33,778 linear feet of streams. The footprint and WOTUS impacts at Seven Hills are significantly less than those approved for impacts at Bear Run and Wild Boar. The stream and wetland impact reductions are shown in the table below.

	<u>Wetlands (Acres)</u>	<u>Streams (linear feet)</u>
Original Application	510.16	53,840
Removed from Impacts	162.14	9,445
“Conditional” Impacts	140.70	10,617
Proposed Initial Impacts	207.32	33,778

Mitigation and Proposed Enhancements:

Consistent with past permits where an ARNI and/or EIS have been requested, Peabody proposes the following mitigation plan to fully satisfy a Mitigated FONSI resolution for the Seven Hills permit. The HGM analysis requested by the Corps and EPA indicate an approximate 2:1 mitigation ratio fully mitigates site impacts. HGM analysis will be utilized on all mitigation sites to finalize values. Peabody believes the plan below produces 734 mitigation credits and an effective 3.5:1 mitigation ratio for the initial mining area. This is a 75% increase over what the HGM analysis shows is needed for mitigation and well exceeds the less than 2:1 average ratio proposed in the original submittal.

- 2.5:1 Wetland mitigation
 - 1:1 on site mitigation
 - 1:1 off-site mitigation in the Highland-Pigeon watershed.
 - 0.5:1 off-site mitigation in the Highland-Pigeon or adjacent watershed.
- High value “preferred” tree species will be utilized on all mitigation sites.
- Add diversity (roughness, pools, etc.) into the mitigation plan
- Lower elevations of previously reclaimed areas on the east side of Pigeon Creek to enhance floodplain effectiveness and create additional wetlands.
- Stabilize and repair drainages connecting the wetlands to Pigeon Creek to prevent further head-cutting into the wetlands.
- At the completion of mining, Peabody will undertake removal of the “levee” along the west side of Pigeon Creek to enhance the connectivity and overbank flooding into the wetlands.
- Add Copperbelly watersnake habitat enhancements in the reclamation/mitigation plans.
- Conduct upstream and downstream sampling for Nutrients pre, post and during mining.
- Place a Conservation Easement on a 20 acre forested wetland tract containing an Indiana Bat roost tree in a survey from 2008. This is located approximately 3 miles south of the mining area.
- Provide a Conservation Easement on the avoided wetlands (219 acres) that provide the buffer between the mining area and Pigeon Creek.
- All intermittent streams will be mitigated at a 1:1 ratio utilizing natural stream restoration techniques.



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

RECEIVED

MAY 17 2016

BY _____

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and

may impact downstream receiving waters, such as the Ohio River. The effects of multiple large scale surface mining operations and agricultural activities have increasingly taken a toll on the Pigeon Creek watershed. Project area aquatic resources, such as contiguous tracts of increasingly rare bottomland hardwood wetlands, filter out nutrients, and excess sediments and other pollutants to help prevent them from entering nearby tributaries. The loss of these project area aquatic resources would eliminate this function and its contribution to maintaining water quality in downstream waters, such as the Ohio River. Furthermore, the agencies have concerns that, based on the past performance of mitigation efforts in nearby watersheds, proposed efforts to offset impacts to project area aquatic resources may not prove successful.

The affected wetlands and other bottomland forest provide essential habitat for state endangered and federally listed species including Indiana bats (*Myotis sodalis*), northern long-eared bats (*Myotis septentrionalis*), evening bats (*Nycticeius humeralis*), cerulean warblers (*Setophaga cerulean*), northern harriers (*Circus cyaneus*), and copperbelly water snakes (*Nerodia erythrogaster neglecta*). All of these species and several state species of special concern have been documented within the project area. The agencies are concerned about the potential impact of the project on these species.

Indiana has lost eighty-five percent of its wetlands, and large remaining tracts such as those present at the project site are rare. In particular, forested wetlands are a declining resource. According to the National Wetland Reports by FWS, forested wetlands experience the greatest decline of all wetlands types. United Minerals asserts that the additional range of habitat types that would result from reclamation activities at the Seven Hills Mine site will be an improvement over existing conditions. However, given the high acreage of forested wetlands that would be lost, the time it takes for forests to mature, and the poor performance of mitigation on the nearby Somerville and North Millersburg mines, it is highly unlikely that the reclaimed areas will develop habitat that is more productive than what currently exists.

The agencies detailed comments follow.

Independent Utility

The Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine (LRL-2013-444-rjb), which is also operated by United Minerals. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine, are also described in the High Point application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would be considered to have independent utility. Therefore, the agencies' request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosures 1 and 2).

Significant Degradation

In accordance with the Clean Water Act Section 404(b)(1) Guidelines (the Guidelines), the agencies believe that this project as proposed may cause or contribute to a significant degradation of Pigeon Creek.¹ The preamble to the Guidelines states that discharges may not be permitted if they will have “significantly” adverse effects on various aquatic resources. In this context, “significant” and “significantly” mean more than “trivial.”

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Secondary impacts include effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.² Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.³

The table below summarizes the cumulative footprints of mining activities in the Highland-Pigeon Creek Watershed and the enclosed map graphically depicts those activities (See Attachment 1).

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Total	62,208	97

Within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations in the last 8 years. An additional, 555.86 acres of wetland impacts (including impacts to 463.83 acres of forested wetlands) and 113,187 feet of stream impacts have been identified on the proposed mine sites for the Seven Hills and High Point mines. In total, the permitted and proposed mining activities account for 18,762.6 acres of direct impact, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

¹ 40 CFR 230.1(c)

² 40 CFR 230.11(h)

³ 40 CFR 230.11(g)

The proposed loss of nearly 500 acres of forested wetlands from this project would will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of freshwater inflow to the Ohio River. Pigeon Creek is listed as impaired for *E. coli*, dissolved oxygen, impaired biotic communities and nutrients and the Ohio River is listed as impaired for *E. coli*, dioxin, total mercury and PCBs on Indiana's 303(d) list of impaired waters.⁴ Given the algal issues in the Ohio River in 2015, the agencies are also concerned about possible effects in the Ohio River with respect to safe drinking water, wildlife and recreation (see Attachment 2).

In addition to the localized impacts to water quality, the increase of nutrients and specifically nitrogen in watershed has had a demonstrated effect on water quality. The United States Geologic Survey published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The Highland-Pigeon Creek watershed was estimated as one of the watersheds to contribute more than 90% of its nitrogen to the Gulf.⁵ EPA's initial SWAT modeling, which does not include cumulative impacts of mining, indicates that the loss of these wetlands along Pigeon Creek would increase nutrient loads to the Ohio River by over 3,500 pounds annually and increase sediment loads by over 260,600 pounds annually.

Project Area Aquatic Resources

The agencies are concerned that the project's CWA Section 404 discharges may result in unacceptable impacts on the Ohio River, Pigeon Creek, and its forested floodplain wetlands. The bottomland hardwood forests within the Pigeon Creek floodplain are an important and productive habitat. In addition to the habitat value of natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain Indiana Department of Natural Resources (IDNR) wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMLD Development Schedules

⁵ Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

Wabash-Erie Canal and a portion of Pigeon Creek onsite is part of the former canal. Today, the creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as “an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the environment.”⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed also help to protect the quality of the Ohio River from nonpoint source pollution from urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River serves as a source of drinking water, hydroelectric energy, shipping route to the Mississippi River, recreation and fishing. There are presently several fish consumption advisories for the Ohio River.⁸

Endangered and Threatened Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), and the federally threatened northern long-eared bat (*Myotis septentrionalis*). An Indiana bat maternity colony from a known primary roost tree has been documented using the southern portion of the proposed project area for foraging, and bat survey results indicate the presence of an additional maternity colony which forages on the northern end of the permit area. Although it has not been addressed in the permit application, at least one northern long-eared bat maternity colony has also been documented in the project area; reproductively active females were captured during bat surveys. The proposed mining activity will temporarily or permanently eliminate approximately 690 acres of summer habitat for these species. The proposed restored forest will not become suitable habitat for many years, if ever.

The copperbelly water snake (*Nerodia erythrogaster neglecta*) is known to have reproducing populations along the Pigeon Creek corridor, with known records of individuals in the project area. This species is federally listed as threatened in the northern part of its range, but listing was precluded in southern Indiana due to the development of a Copperbelly Water Snake Conservation Agreement and Strategy, endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective in avoiding impacts to and conserving copperbelly water snake habitat. This permit application is the first action that the FWS is aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

The following species were also documented within the project area:

⁷ <http://www.evansvillegov.org/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

State endangered species: northern harrier, least bittern, black-crowned night heron, black tern, Henslow's sparrow, osprey, yellow-headed blackbird, short-eared owl, sedge wren, marsh wren, barn owl, Virginia rail, American bittern, and loggerhead shrike.

Waterfowl: Canada goose, gadwall, mallard, hooded merganser, red-breasted merganser, bufflehead, ruddy duck, wood duck, northern shoveler, lesser scaup, American wigeon, redhead, ring-necked duck, green-winged teal, common goldeneye, northern pintail, snow goose, canvasback, American black duck, tundra swan, greater scaup, cackling goose, white-winged scoter, common merganser, and mute swan.

Scope of NEPA Analysis

The NEPA analysis should include the entirety of the area proposed for mining, including both uplands and aquatic resources. As a result of the proposed Corps' action, there would be direct, indirect, and cumulative human health and environmental impacts beyond the regulated waters, including indirect or cumulative impacts that may be outside of the mine footprint. The NEPA analysis should extend outside of the regulated activity because the "*environmental consequences of the larger project are essentially products of the Corps permit action*".⁹ Further, based on potential impacts to aquatic resources and threatened or endangered species, sufficient Federal involvement exists to expand the scope of the NEPA analysis beyond the regulated activity.¹⁰ Based on the above, the agencies find that the scope of the NEPA analysis should extend outside of the regulated activity, based on potential direct, indirect, and cumulative impacts to resources.

As discussed above under *Independent Utility*, EPA recommends the scope of the NEPA analysis include both the Seven Hills Mine and the adjacent High Point Mine. The analysis should also consider other mines which may be connected actions¹¹ and/or similar actions.¹² Impacts from nearby mining operations should be analyzed in the same NEPA document.

Preparation of an Environmental Impact Statement

NEPA states that major federal actions which could significantly affect the quality of the human environment require an EIS be prepared. The Council on Environmental Quality (CEQ) has defined "significantly" by two criteria: *context* and *intensity* of impacts of the proposed project.¹³ Seven Hills Mine would cause significant environmental impacts, and, therefore, an EIS should be prepared. We recommend consideration of the following factors regarding significance:

- **Cumulative Impacts:**¹⁴ The proposed mine and the other mining activities would likely lead to impacts to the environment and human health that are cumulatively significant. Mining in this watershed has continued over the last 100 years. A

⁹ 33 CFR Part 325, Appendix B Section 7(b)(2)

¹⁰ 33 CFR 325 Appendix B, Section 7(b)(2)(iv)

¹¹ 40 CFR § 1508.25(a)(1)

¹² 40 CFR § 1508.27

¹³ 40 CFR § 1508.27

¹⁴ 40 CFR § 1508.27(b)(7)

cursory examination of surface coal mining projects within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) in the last 8 years shows that over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations. Additionally, 555.86 acres of wetland and 113,187 feet of stream have been identified on the proposed mine sites, which include Seven Hills and High Point mines. All permitted and proposed mining activities in the last 8 years directly affect 18,762.6 acres, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

Both particulate matter and hazardous air pollutant levels would be expected to increase as a result of continued mining in the area, exacerbating human health problems related to poor air quality. Nearby communities also experience cumulative and multiple impacts related to the mining and processing of coal, such as noise and vibration. Additionally, the eventual combustion of coal mined at Seven Hills and High Point mines would release high levels of greenhouse gas emissions and contribute to climate change. Therefore, because the impacts from the Seven Hills Mine and other proposed mines could potentially have cumulatively significant impacts on human health and the environment, an EIS should be prepared.

- Unique characteristics of the geographic area:**¹⁵ The mine site includes areas which the agencies consider to be of significant value: Pigeon Creek and the bottomland hardwoods in the Pigeon Creek watershed. The subwatershed (12-digit HUC Clear Branch Pigeon Creek) is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans. The fact that eighty five percent of the wetland resources once present in Indiana have been lost or altered makes remaining wetlands especially critical resources for conservation.¹⁶ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits, such as maintaining the quality of drinking water and controlling flooding, and in environmental benefits, such as providing habitat for wildlife, including threatened and endangered species. The resources proposed for impact onsite are used by an endangered species, a threatened species, and a species listed as threatened in its northern range. Based on the scale of the proposed project's impacts to important aquatic resources and other ecologically critical areas, an EIS should be prepared.
- Public Health or Safety:**¹⁷ Living near proposed surface coal mines increases exposure to pollutants and other hazards, raising human health concerns, such as cardiopulmonary diseases and cancers, respiratory disease, kidney disease, hypertension, and issues related to psycho-social stressors.¹⁸ Environmental impacts

¹⁵ 40 CFR § 1508.27(b)(3)

¹⁶ Status and Trends Report on State Wetland Programs in the United States.

¹⁷ 40 CFR § 1508.27(b)(2)

¹⁸ Hendryx, M., and Ahrem, M. *Relations between health indicators and residential proximity to coal mining in West Virginia*. American Journal of Public Health, 2008; 98: 669-671, Walker, E., PhD and Payne, D., MPH *Health Impact Assessment of Coal and Clean Energy Options in Kentucky*. Rep. Kentucky Environmental Foundation, n.d. Web 19 Nov. 2015

from surface coal mining, processing, and burning that contribute to human health include, but are not limited to, water contamination, air emissions, noise, vibration, and flooding. Federally enforceable state regulations prohibit visible emissions from mining activities from crossing property lines,¹⁹ though mine blasting may not be able to meet that requirement. Demographic data indicate a high percentage of children living in the area are under the age of five. Children are particularly vulnerable to impacts from exposures to air pollutants. Environmental data show high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. We are concerned about cumulative impacts to the surrounding communities given that Seven Hills Mine would be located near other operating and proposed mines, further exacerbating existing exposures. Based on the potentially significant impacts to public health and safety, an EIS should be prepared.

- **Threatened and Endangered Species:**²⁰ As discussed above, the proposed Seven Hills Mine is within the range of the endangered Indiana bat (*Myotis sodalis*) and the threatened Northern long-eared bat (*Myotis septentrionalis*) and these species have been documented using the site. Additionally, the Copperbelly watersnake (*Nerodia erythrogaster neglecta*) is known to have breeding populations along Pigeon Creek. Because there are potentially significant impacts to threatened or endangered species, an EIS should be prepared.

The agencies note that preparation of an EIS for a surface coal mine would not set a new precedent for the analysis of impacts to human health and the environment. EISs have been prepared for coal mines with similar scopes of impacts, such as:

- Fort Worth Corps District is currently considering a Regional Draft EIS for Surface Coal and Lignite Mining in Texas (Draft EIS CEQ #20150191);
- Fort Worth Corps District prepared an EIS for the Rusk Mine in Texas (Final EIS CEQ #20110148);
- Fort Worth Corps District prepared an EIS for the Three Oaks Mine in Texas (Final EIS CEQ #20030199); and
- Louisville Corps District previously issued an EIS for the Delta Coal Mine Complex in Illinois (Final EIS CEQ #19960416).

The NEPA process allows the Corps to fully consider potential impacts and measures to avoid, minimize, and mitigate those impacts as a means to achieve more informed decision-making and better project outcomes. The scope of analysis for the NEPA document on the proposed Seven Hills Mine should cover the entire mine site, including both uplands and aquatic resources, and the entirety of High Point Mine. Due to potentially significant cumulative impacts, adverse impacts to threatened and endangered species, impacts to unique characteristics of the geographic area, and risks to public health and safety, the agencies believe the Corps should prepare an EIS.

¹⁹ 326 Indiana Administrative Code 6-4-2

²⁰ 40 CFR§ 1508.27(b)(9)

Mitigation and Monitoring

The applicant proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 19.81 acres palustrine emergent, 13.43 acres of palustrine emergent, and 1.04 acres of palustrine unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial stream, using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.²¹ An in-depth discussion regarding mitigation is premature without first considering additional avoidance and minimization efforts to help ensure that proposed discharges represent the least environmentally damaging practicable alternative. However, the agencies have reviewed the proposed on-site and off-site compensatory mitigation plans and offer the following general comments at this time to help improve the mitigation plan.

The mitigation plan does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, it is imperative to take connectivity into account when designing mitigation.

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. Forested wetlands experience the greatest decline of all wetland types and are extremely difficult to restore or create.

EPA and FWS recommend that the applicant be required to mitigate for bottomland hardwood forest at a ratio of 4:1. This ratio is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.²² For mitigation to be considered successful, performance standards in the mitigation plan would have to be achieved. It is our understanding that the hydrology will not be re-established until the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (rather than the mitigation proposed at the “avoided” areas).

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and success in generating functional lift is often

²¹ 40 CFR 230.91(c)

²² 40CFR 230.93(f)(2)

elusive. The FWS asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland forest associated with the North Millersburg Mine. The finished topography on much of the reclaimed area was too high in elevation to function as bottomland forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments looks more like rolling hills than floodplain. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Final Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally done by applying appropriate ratios so that the amount of compensation will be adequate to offset the authorized impacts even if the mitigation is not 100% successful.

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the proposed mine boundary and discusses how restoration in areas east of Pigeon Creek will allow for streams and wetlands to interact hydrologically during periods of overbank flooding. However, it is unclear how this interaction will be affected given the existing levee that runs along the east edge of Pigeon Creek, directly west of a portion of the proposed on-site mitigation. The floodway modification plan for this area is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for forested wetland based on the referenced study. Additional clarification on the determination of 2,500 acres as the contributing cumulative watershed is needed. The mitigation plan does not detail how the proposed stream and wetland mitigation will tie in with aquatic resources adjacent to the site boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results from attempting to restore streams in mined areas. It is likely that the intermittent and ephemeral streams would not have adequate flow, which will impact existing uses in the compensatory mitigation streams. Considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

In addition to the on-site reclamation, the applicant proposes off-site mitigation on 575.9 acres on Greathouse Island, an abandoned oxbow of the Wabash River, in Posey County, Indiana. Proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 258.9 acres of existing forested wetland. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact, and while it may provide some benefits to the Ohio River, to which the Wabash River is a tributary, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. Permittee-responsible mitigation (PRM) projects are designed to offset specific impacts, and are therefore more likely to reduce the severity of project site impacts. The off-site PRM proposed on Greathouse Island appears to be intended to offset functional losses, however, they would not occur within the project footprint and would not result in functional gains within the watershed. According to the application, the enhancement areas will be selectively harvested to reduce the existing canopy cover by 50 percent. It is

unclear how harvesting trees from an existing forested wetland will provide mitigation for forested wetland impacts. The instability of the proposed site is also of concern. This site is a remnant meander of the Wabash River that is part of a dynamic system within a floodplain. Upstream hydrologic processes and perturbations will control hydrology in this area, including reactivating former channels and influencing channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity.

The applicant claims that the off-site mitigation will provide additional habitat for the federally endangered Indiana bat, as well as several other bat species. While the mitigation, if successful, will provide habitat for the Indiana and northern long-eared bat, it will take several years before it is suitable foraging habitat and many more years before it becomes suitable roosting habitat, if ever. Also, the off-site mitigation will not provide any benefit to the known maternity colonies in the proposed project area, as both Indiana and northern long-eared bats display high site fidelity, returning to the same roosting habitat year after year.

While the objectives of the mitigation area are to provide flood, sediment, and nutrient storage for the Wabash River, there is no indication of the degree or level of functional lift provided compared to existing conditions, how that lift would benefit the watershed of impact or the likelihood of success given the activities proposed. Because it will take some years before the off-site mitigation is established, and it is nearly 40 miles and two watersheds away from the impact area, it is unlikely to offset either the temporal or cumulative loss of wetlands. EPA and FWS recommend the applicant explore mitigation opportunities within the impacted watersheds specified in the IDEM June 2003 Highland-Pigeon Creek Watershed Management Plan.

Monitoring and Long Term Management

The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas. The Guidelines state that “financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments”.²³ The increase in coal companies filing for Chapter 11 Bankruptcy²⁴ and the inherent risk in re-creating streams and wetlands on-site in the post mining landscape necessitate the establishment of appropriate financial assurances.

To comply with the Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs and annual cost estimates for these needs, and should identify the funding mechanism that will be used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

²³ 40 C.F.R. §230.93(n)(2)

²⁴ <http://www.businessfinancenews.com/24344-is-arch-coal-inc-on-the-verge-of-chapter-11-bankruptcy/>

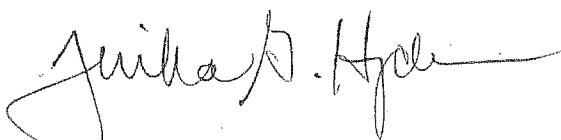
An adaptive management plan is provided, however, it does not include a root cause analysis or describe necessary corrective actions if insufficient hydrology makes stream restoration infeasible.

As part of the monitoring program for affected and reconstructed streams, physical, chemical and biological monitoring should be required. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

Thank you for your consideration of our comments and recommendations to aid in the evaluation of project impacts to environmental resources within the Pigeon Creek Watershed, consistent with the requirements of the NEPA, CWA and ESA. We look forward to discussing these comments with you. Prior to the closing of the public comment period additional CWA Section 404 comments will be forthcoming. Please contact Wendy Melgin from the U.S. Environmental Protection Agency at melgin.wendy@epa.gov or (312) 886-07745 and Marissa Reed from U.S. Fish and Wildlife Service at marissa_reed@fws.gov or (812)334-4261 with any questions.

Sincerely,



Tinka Hyde
Director, Water Division
U.S. Environmental Protection Agency



Scott Pruitt
Field Supervisor
U.S. Fish and Wildlife Service

Enclosures
Attachments

cc: Martha Clark-Mettler, IDEM
David Carr, IDEM
LeAnne Devine, USACE-Louisville District
George DeLancey, USACE-Louisville District
Bob Krska, USFWS-Regional Office, Bloomington, MN
Jason Miller, USFWS-Headquarters, Falls Church, VA

Enclosure 1



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

NOV - 6 2013

REPLY TO THE ATTENTION OF:
 WW-16J

U.S. Army Corps of Engineers, Louisville District
 ATTN: Mr. George DeLancey, CELRL-OP-FW
 P.O. Box 489
 Newburgh, Indiana 47629-0489

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Mr. DeLancey:

The U. S. Environmental Protection Agency has reviewed the preliminary Clean Water Act (CWA) Section 404 permit application (permit application) for the subject project. Under United Minerals Company, LLC's preliminary proposal, approximately 458.2 acres of wetlands (of which 401.5 acres are forested) and 31,762 linear feet of streams, would be impacted for the construction of the 2,351.2-acre Seven Hills Mine in the Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 1,370.3 acres of the site has been previously mined. Two distinct previously mined areas lie in the eastern and southern portions of the permit area. We offer the following comments based on our review of the preliminary permit application.

Land Use/Existing Conditions

A November 2010 letter from the United States Fish and Wildlife Service (USFWS) to the Indiana Department of Natural Resources (IN DNR) commenting on the Surface Mining Control and Reclamation Act (SMCRA) permit application for the Seven Hills Mine, conveyed serious concerns about proposed impacts to wetlands and other bottomland forest along Pigeon Creek that provide abundant habitat for numerous and significant wildlife species, including migratory birds, the Copperbelly water snake (*Nerodia erythrogaster neglecta*), and the federally endangered Indiana bat (*Myotis sodalis*). In addition to the habitat value of these natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.¹ Forested wetlands are ecologically important systems and represent some of the most diverse, complex, and productive freshwater wetlands in the Nation. In spite of their high value, these systems have experienced significant decline in

¹ <http://water.epa.gov/type/wetlands/bottomland.cfm>

area throughout the United States. Between 2004 and 2009, forested wetlands declined by an estimated 633,100 acres. This trend in forested wetlands loss only heightens the significance of any additional loss of these resources.²

United Minerals Company, LLC (UMC) asserts that the additional range of habitat types that would result from reclamation at the Seven Hills Mine site will be an improvement over existing conditions; however, this assertion is not supportable given the high acreage of forested wetlands that would be lost.

Alternatives Analysis

The preliminary application information does not provide an adequate range of alternatives that avoid and minimize impacts to aquatic resources at the project site to the maximum extent practicable under the CWA Section 404(b)(1) Guidelines (Guidelines). The amount of effort and level of detail included in the analysis must be commensurate with the level of aquatic resources impacted, which EPA believes to be significant in this case. EPA strongly recommends the applicant provide alternatives that include considerable avoidance of valuable bottomland wetland habitat. For example, UMC should consider alternatives that include mining from the eastern portion of the site (which includes previously mined areas) towards the west, up to the bottomland wetland areas (leaving a sufficient buffer), and augering under the wetlands. UMC makes a general statement in the permit application that “historically augering activities have proven to not be cost effective in most circumstances.”

EPA understands that more coal can be extracted using the open pit method than the augering method; however, no information is provided to demonstrate that augering is cost prohibitive specific to this project. The practicability of each alternative should be considered in light of cost, logistics, and available technology and evaluated at a level that reflects the significance of the resources to be impacted.

Cumulative Impacts

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines, the applicant should prepare a cumulative impacts analysis that details changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct and indirect impacts from previous and current actions as well as impacts from future actions as a result of changes in surface and groundwater hydrology.

The cumulative impacts analysis should also discuss potential ecological impacts associated with the loss of forest cover and forest fragmentation along the Pigeon Creek bottomlands. As mentioned above, USFWS expressed this as a serious concern in its November 2010 letter to IN DNR. The mining activity would temporarily or permanently eliminate at least 600 acres of summer habitat for the endangered Indiana bat (*Myotis sodalis*) and valuable habitat for other

² United States Fish and Wildlife Service. 2011. *Status and Trends of Wetlands in the Conterminous United States 2004 to 2009*.

species such as the Copperbelly water snake (*Nerodia erythrogaster neglecta*). EPA understands that listing of this species in southern Indiana was precluded due to development of a *Copperbelly Water Snake Conservation Agreement and Strategy* (Agreement) endorsed by the USFWS, IN DNR, and the Indiana Coal Council, which is now expired. According to the USFWS, since the expiration of the Agreement, all parties have continued to implement the goals of the Agreement voluntarily, to avoid and conserve Copperbelly water snake habitat. This permit application is the first USFWS is aware of that would not follow the tenants of the Agreement.

A Clean Water Act Section 404 permit was issued for the nearby Liberty Mine, LRL-2010-218-gjd, in April 2012. The permit authorized impacts to 8,948 feet of perennial streams, 5,183 linear feet of intermittent streams, 6,212 linear feet of ephemeral streams, 35.3 acres of forested wetlands, 63.3 acres of emergent wetlands, and 0.8 acre of scrub-shrub wetlands. In addition, the recently proposed High Point Mine (LRL-2013-444-rjb) is approximately 3084.6 acres in size and abuts the proposed site. According to Robert Brown of your office, the proposed High Point Mine would impact approximately 27 acres of wetlands and 63,000 linear feet of streams. This mine would also be operated by UMC. EPA requests that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. They are abutting UMC mines, appear to be at similar stages of development in the permitting process, and the preparation plant serving both operations would be constructed on the High Point Mine site.

Environmental Justice Concerns

Based on the limited information provided in the permit application and other environmental and demographic data, EPA believes the proposed mine may raise environmental justice concerns. Demographic data indicate there are both high percentages of low-income individuals and children under the age of five, who are particularly vulnerable to impacts from mining operations. Environmental data shows high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. EPA is concerned that communities would potentially be disproportionately impacted by the proposed mine. Further, EPA is concerned about cumulative impacts to the surrounding communities, given that the proposed mine would be located near an operating mine, further exacerbating existing exposures to sensitive populations.

Preparation of an Environmental Impact Statement

Section 102(2)(C) of NEPA identifies major federal actions that “significantly” affect the quality of the human environment requiring an environmental impact statement (EIS). In regulations the Council on Environmental Quality promulgated under NEPA, ‘significantly’ is defined by two criteria: context and intensity of impacts of the proposed project.³ ‘Context’ refers to the affected environment in which a proposed action would occur and ‘intensity’ means the degree to which the proposed action would include one or more of the factors listed below, among others. The Seven Hills Mine, as currently proposed, appears to exceed thresholds for significance based on the context and intensity of the project. Therefore, EPA strongly recommends that the Corps prepare an EIS for this project for the following reasons:

³ 40 CFR § 1508.27

- **Unique characteristics of the geographic area:** The Seven Hills Mine would impact approximately 458.2 acres of wetlands and 31,562 linear feet of streams. The impacted subwatershed is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans.⁴ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits, such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or altered makes wetlands especially critical resources for conservation.⁵ Because of the scale of the proposed project's impacts to ecologically critical areas, EPA views the preparation of an EIS as appropriate.⁶
- **Public Health or Safety:** As discussed above, the proposed mine may raise environmental justice concerns. Adjacent communities include a high number of low-income individuals and a high number of children under the age of five. These populations are more sensitive to impacts and potentially experience unique exposure pathways. Communities may be exposed to multiple mine-related impacts, including fugitive dust, noise, and water discharge. Based on this, the potential for public health and safety risks are increased and an EIS should be prepared.⁷
- **Cumulative Impacts:** As mentioned in the comments on Cumulative Activity, Seven Hills Mine would be located near an active mine and abutting a proposed mine. Additional mining activities would likely lead to impacts that are cumulatively significant.⁸ The cumulative impacts from the Seven Hills Mine and other proposed mines could potentially have significant impacts on human health and the environment, and would be grounds for the preparation of an EIS.
- **Threatened and Endangered Species:** As discussed above, the proposed Seven Hills Mine is within the range of Indiana bat (*Myotis sodalis*) maternity roosting habitat (endangered) and the Copperbelly watersnake, which has been previously proposed for inclusion on the federal threatened species list for this area. Potential impacts to threatened or endangered species are considered grounds for the preparation of an EIS.⁹

As discussed above, EPA believes the proposed project should be analyzed in conjunction with other similarly proposed projects in the area, including the High Point Mine. The operation of both mines relies on shared infrastructure, including the preparation plant, which is located within the proposed footprint of High Point Mine. This qualifies the permitting of both mines as connected actions,¹⁰ which should be analyzed in one NEPA document.

⁴ <http://ai.org/idem/nps/3241.htm>

⁵ Indiana Department of Natural Resources. 1996. *Indiana Wetlands Conservation Plan*.

⁶ 40 CFR § 1508.27(b)(3)

⁷ 40 CFR § 1508.27(b)(2)

⁸ 40 CFR § 1508.27(b)(7)

⁹ 40 CFR § 1508.27(b)(9)

¹⁰ 40 CFR 1508.25(a)(1)

Mitigation and Monitoring

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.¹¹ An in-depth discussion regarding mitigation is premature given the applicant first needs to adequately address avoidance and minimization. However, per the Corps' request, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following general comments at this time to help improve the mitigation plan.

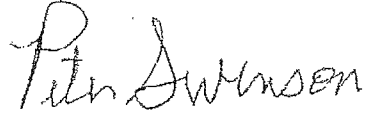
- The applicant needs to document how avoided stream reaches will be preserved or affected during mining and what that will mean for reconstructed stream reaches in terms of flow regime.
- The applicant needs to explain the rationale behind selecting the proposed performance goals of EPA Rapid Bioassessment Protocol (RBP) scores of at least 115 for intermittent stream mitigation reaches and at least 110 for ephemeral stream mitigation reaches. EPA recommends that the applicant locate reference reaches in the area to use as a guide to develop stream mitigation goals. As you know, reference conditions in the region can be used to scale the assessment to the "best attainable" condition for mitigation reaches.
- The mitigation ratio proposed for forested wetland is 2:1. The proposed mitigation ratio is too low given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. EPA recommends that the applicant be expected to mitigate for bottomland hardwood forest at a ratio of 4:1.
- The off-site wetland mitigation proposal is in need of significant improvement. More detail on the existing conditions of the mitigation areas, especially those proposed for preservation and enhancement, is necessary to determine the merit of the proposal.
- The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas.
- As part of the monitoring program for affected and reconstructed streams, biological monitoring should be required to ensure there is no degradation to the communities that inhabit the streams. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

In conclusion, we strongly recommend that the Corps consider our recommendation to prepare an EIS for this project and our comments above to protect the significant resources within the Pigeon Creek bottomlands. Thank you for the opportunity to review the preliminary application for the Seven Hills Mine. We look forward to discussing these comments with you. Please

¹¹ 40 CFR 230.91(c)

contact Melissa Blankenship of our office at (312) 886-6833 or (503) 326-5020 with any questions.

Sincerely,

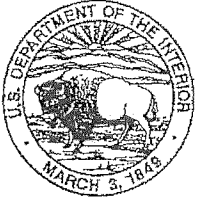
A handwritten signature in dark ink, appearing to read "Peter Swenson". The signature is fluid and cursive, with the first name "Peter" and last name "Swenson" clearly distinguishable.

Peter Swenson, Chief
Watersheds and Wetlands Branch

cc: David Carr, IDEM
Scott Pruitt, USFWS-Bloomington
James Townsend, USACE-Louisville District

Enclosure 2

Elizabeth Ful/Flie

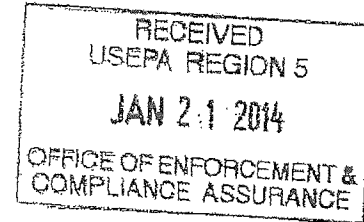


United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 10, 2014



Mr. George DeLancey
U.S. Army Corps of Engineers
CELRL-OP-FW
P.O. Box 489
Newburgh, IN 47629-0489

Dear Mr. DeLancey:

This responds to your letter of August 13, 2010 requesting U.S. Fish and Wildlife Service (FWS) comments on a permit application (LRL-2013-635) for the United Minerals Company, LLC proposed Seven Hills Mine (S-00357) in Warrick County, Indiana.

These comments are consistent with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service's Mitigation Policy, and the Indiana Coal Mining Regulatory Program, Section 310 IAC 12-3-107.

The proposed permit area covers 2351 acres. The proposed water resource impacts include over 31,762 feet of stream channel (2,589 feet ephemeral, 28,973 feet intermittent, and 200 feet perennial), approximately 458 acres of wetlands (401.5 forested, 4.45 emergent, and 52.15 shrub), and 29 acres of open water.

The permit area contains a combination of undisturbed bottomland along Pigeon Creek, including approximately 7,876 feet of the Pigeon Creek channel, and previously mined land in the North Millersburg, South Millersburg and Ayrshire mines. Most of the previously mined land has been reclaimed to a mixture of forest, wildlife land and agricultural land.

Wildlife Habitat

The affected wetlands and other bottomland forest provide abundant habitat for numerous and significant wildlife species, including migratory birds, Indiana bats (*Myotis sodalis*), Northern long-eared bats (*M. septentrionalis*), and the copperbelly water snake (*Nerodia erythrogaster neglecta*). We do not have a comprehensive bird species list for the permit area, however bird surveys by Audubon Society members in the Buckskin Bottoms area north (upstream) of the

permit area reported over 180 species of birds including 9 species listed at that time as State-endangered species.

An Indiana bat maternity colony from a known primary maternity roost tree has been documented using the southern portion of the proposed permit area for foraging, and bat survey results suggest the presence of an additional maternity colony which forages on the northern end of the permit area. The proposed mining activity would temporarily or permanently eliminate approximately 690 acres of summer habitat for this species and restored forest will not become suitable habitat for many years.

At least one Northern long-eared bat maternity colony has also been documented using the permit area with the capture of reproductively active females during bat surveys. Northern long-eared bats generally require similar summer habitat to that of Indiana bats, therefore the proposed mining activity would impact approximately 690 acres of habitat for this species.

The copperbelly water snake is known to have reproducing populations along the Pigeon Creek corridor. Listing in southern Indiana was precluded due to development of a Copperbelly Water Snake Conservation Agreement and Strategy endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective at avoiding and conserving copperbelly water snake habitat. This permit application is the first action we are aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

Mitigation

A thorough review of the proposed mitigation has not been conducted; however, the FWS asserts that wetlands of this magnitude and in this landscape location cannot be adequately restored based on the failure of previous efforts associated with the North Millersburg Mine. The North Millersburg mined land on the east side of the Pigeon Creek floodplain was to have been restored to its pre-mining condition of bottomland forest, however the actual restoration consisted chiefly of a mixture of upland fields, upland non-forested wildlife habitat and large, shallow permanent impoundments.

Cumulative Impacts

The proposed Seven Hills Mine, in combination with the two previous Millersburg Mines, would permanently or temporarily eliminate the vast majority of approximately 4000 acres of habitat along the Pigeon Creek corridor. As previously stated in this letter, the bottomland forest in the North Millersburg permit area was permanently lost. In addition, the newly proposed High Point Mine would impact approximately 2,500 acres of wildlife and forest habitat, including 27 acres of wetlands and 63,000 linear feet of streams.

A November 2013 letter from the U.S. Environmental Protection Agency (EPA) to the U.S. Army Corps of Engineers (Corps) requests that the Corps treat the High Point Mine and the Seven Hills Mine as a single project. The FWS supports this request since the mines have overlapping permit boundaries and will share a coal processing plant.

Endangered Species

The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*), sheepsnose mussel (*Plethobasus cyphus*) and the northern long-eared bat (*M. septentrionalis*), a species proposed as endangered under the Endangered Species Act. The sheepsnose mussel is restricted to the Ohio River and will not be impacted by the proposed mining operation.

As stated previously, there is known summer habitat for Indiana and northern long-eared bats present throughout the permit area, and the proposed mining operation will eliminate a significant amount of habitat for these species. In accordance with our national biological opinion issued to the Office of Surface Mining, United Minerals Company developed an Indiana Bat Protection and Enhancement Plan (PEP) outlining measures to minimize take of Indiana bats. To date, the northern long-eared bat has not been addressed.

The northern long-eared bat was proposed for federal listing under the ESA on October 2, 2013. Species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against take applies. The final listing decision for the northern long-eared bat is expected in October 2014. This could cause project delays, since potential adverse effects to the northern long-eared bat have not been previously addressed. Therefore, the FWS strongly encourages applicants to address the northern long-eared bat while it is proposed for listing. Interim guidance on addressing impacts to northern long-eared bats can be found on online at <http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>

In conclusion, the FWS continues to oppose a mining plan that will substantially alter the Pigeon Creek bottoms and result in hundreds of acres of wetland impacts. We recommend that the mining operation be altered to avoid mining disturbance in existing forest and wetland habitat in the Pigeon Creek floodplain.

Due to the extensive wildlife habitat proposed under this mining plan, and the extent of cumulative impacts of mining in the Pigeon Creek bottomland corridor, we believe that development of an Environmental Impact Statement is appropriate.

The FWS considers the Pigeon Creek floodplain to constitute a productive and valuable public resource which serves significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting habitat for aquatic and land species. As defined by the Section 404(b)(1) Guidelines, we consider the site to be a Special Aquatic Site that possesses special ecological characteristics of productivity, habitat, wildlife protection and

Page 4 of 4

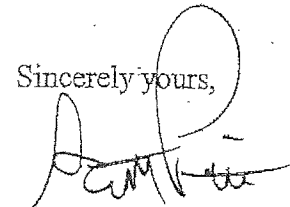
other important and easily disrupted ecological values. Therefore, the U.S. Fish and Wildlife Service requests that this permit be denied.

Pursuant to Part IV, Paragraph 3(a) of the Memorandum of Agreement Between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act dated December 21, 1992, it is the opinion of the Department of the Interior that the project may result in substantial and unacceptable impacts to aquatic resources of national importance.

We are providing this letter to reserve the option to elevate this individual permit action if significant differences remain between our agencies over the disposition of this permit, in accordance with the Memorandum of Agreement (MOA) between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act, dated December 21, 1992. Pursuant to Part IV, Paragraph 3(b) of the MOA, it is the opinion of the Department of the Interior that the project will result in substantial and unacceptable impacts to aquatic resources of national importance.

For further discussion, please contact Marissa Reed at (812) 334-4261 ext. 1215 or marissa_reed@fws.gov.

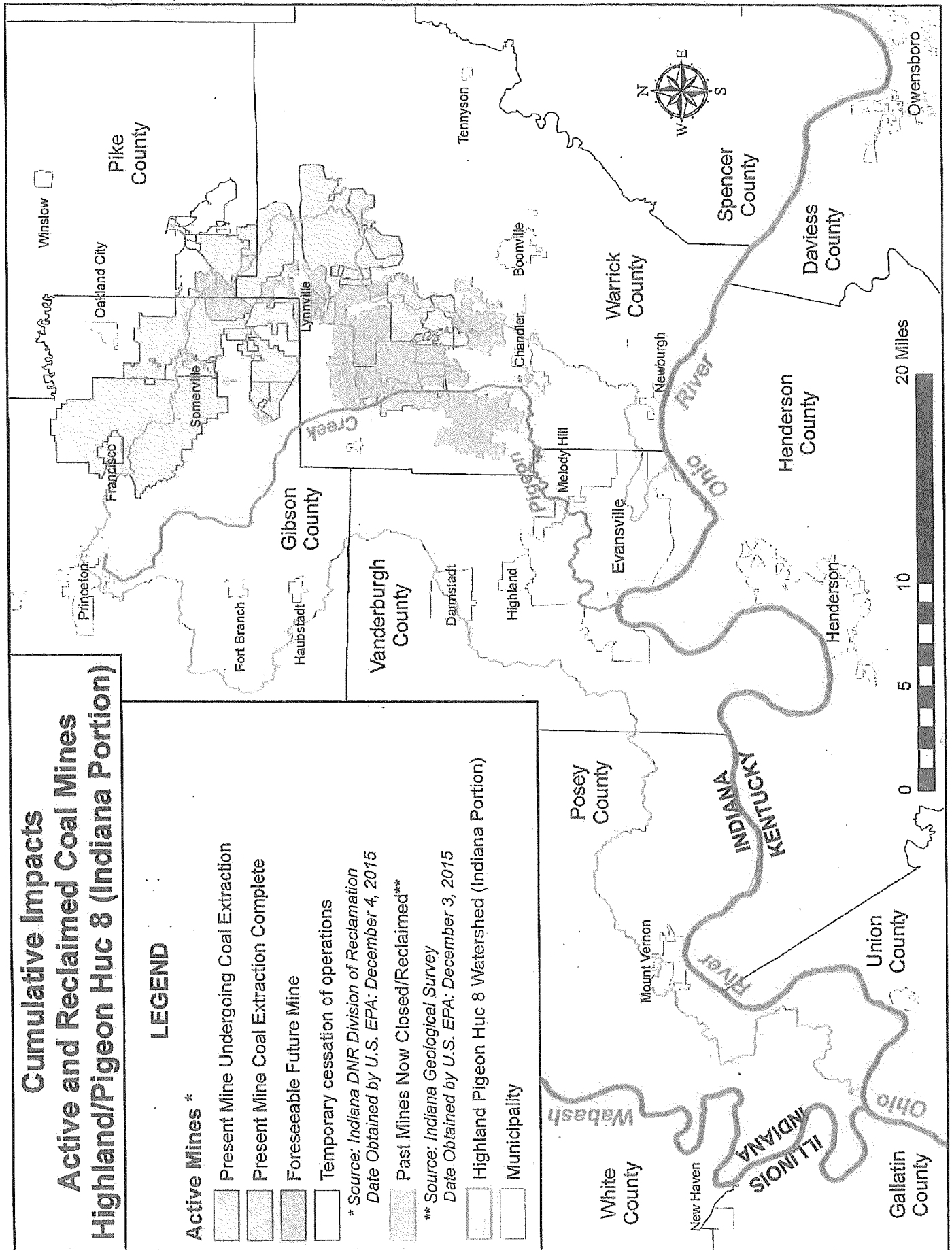
Sincerely yours,



Scott E. Pruitt
Field Supervisor

cc: Ramona Briggeman, IDNR Division of Reclamation, Jasonville, IN
Eric Langer, IDNR Division of Reclamation, Jasonville, IN
✓ Melissa Blankenship, US EPA, Chicago, IL

Attachment 1



Attachment 2

October 2015 Microcystin Concentrations and Proximity to Drinking Water Intakes

LEGEND

- Microcystin Concentrations Exceeds EPA and IDEM Thresholds for Drinking Water and Recreation
- Microcystin Concentrations Below EPA and IDEM Thresholds for Drinking Water and Recreation

N Non Detects

⊗ Public Water Supply Intakes

Highland Pigeon Huc 8 Watershed (IN Portion)

Mainstem Pigeon Creek Floodplain Wetlands *

Forested Wetlands (4461 Acres)

Other Wetland Types (1709 Acres)

Open Water (255 Acres)

* Source of Wetland Data: National Wetland Inventory, USFWS

I N D I A N A

I L L I N O I S

Wabash River

Mount Vernon
WATER WORKS

New Haven

Uniontown Lock and Dam

MORGANFIELD
WATER WORKS

K E N T U C K Y

River

HENDERSON MUNICIPAL
WATER & SEWER

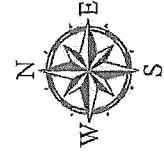
Henderson

Evansville

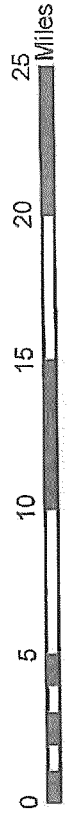
Newburgh 59.4 ug/L

Newburgh Lock and Dam

Ohio River



Owensboro



Winslow

Princeton

Francisco

Oakland City

Owensville

Fort Branch

Spurgeon

Somerville

Mackey

Haubstadt

Cynthiana

Elberfeld

7 Hills Mine Site

Damstadt

Chandler

Boonville

Tennyson

May. 2. 2016 2:51PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 2



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 14 2016

REPLY TO THE ATTENTION OF:

WW-16J

Colonel Christopher G. Beck
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Subject: Comments on Public Notice LRL-2013-635-GJD; Proposed Seven Hills Mine,
Warrick County, Indiana.

Dear Colonel Beck:

The U.S. Environmental Protection Agency has reviewed the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service (FWS) (Enclosure 1). As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

Based on our review of the previous and currently available information, and pursuant to Part IV, paragraph 3(a) of the 1992 CWA Section 404(q) Memorandum of Agreement between the EPA and Department of the Army, the EPA is hereby notifying the U.S. Army Corps of Engineers (Corps) that this project may have substantial and unacceptable impacts on aquatic resources of national importance.

The proposed Seven Hills project would mine through over 460 acres of floodplain forested wetlands and 10 miles of streams tributary to Pigeon Creek. From its headwaters, Pigeon Creek flows approximately 50 miles through the project area and bisects downtown Evansville, before joining the Ohio River. The EPA considers Pigeon Creek, its floodplain forested wetlands, and the Ohio River to be aquatic resources of national importance. Project area aquatic resources consist of contiguous tracts of increasingly rare floodplain forested wetlands. These wetlands are diverse and productive systems that are located on floodplains and inundated by flood waters. The Pigeon Creek floodplain forested wetlands filter nutrients, excess sediments and other

pollutants from Pigeon Creek before it enters the Ohio River. The loss of these project area aquatic resources would also reduce habitat and the floodplain's ability to attenuate and store flood waters.

The CWA Section 404(b)(1) Guidelines (Guidelines) provide the substantive environmental criteria against which this Section 404 permit application must be evaluated. Based on our review of the public notice and associated permit application materials, the applicant has not demonstrated compliance with several aspects of the Guidelines. These concerns are outlined below and described in detail in the attachments.

40 CFR Part 230.10(a) Alternatives Analysis

Fundamental to the Guidelines is the premise that no discharge of dredged or fill material may be permitted if a practicable alternative to the proposed discharge exists that would have a less adverse impact on the aquatic environment.¹ The Seven Hills Mine would abut United Minerals' proposed 3,085 acre High Point Mine. As proposed, these mines would share coal slurry facilities and other common features. Haul roads and other features that were proposed as components of the High Point Mine are designed to serve both mines and, in certain cases, some only serve the Seven Hills Mine. The Surface Mining Control and Reclamation Act permit application for the Seven Hills Mine also includes portions of the High Point operation in the mine boundary. Evaluating these operations separately limits the analysis of alternatives, including opportunities for a more complete evaluation of additional practicable alternatives that reduce or eliminate significant impacts to the floodplain forested wetlands and other aquatic resources on the Seven Hills Mine site. Therefore, the EPA reiterates the request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project.

The Guidelines provide a rebuttable presumption that less damaging practicable alternatives exist. In its application, United Minerals highlights that 17 billion tons of recoverable coal remain in Indiana and 130 billion tons occur within the Illinois Coal Basin, which includes Indiana coal. Based on the information provided by United Minerals, EPA does not believe the applicant has demonstrated that the Seven Hills site is the least environmentally damaging practicable alternative. For example, United Minerals should provide a comparative evaluation of the environmental impacts associated with additional alternatives within the same coal basin that would meet the basic project purpose and entail recovery from other coal reserves and holdings that it owns or that could reasonably be obtained through a parent company or other contractual relationships.

We look forward to continuing to work with the Corps and applicant to explore practical, cost-effective alternatives to reduce the environmental impacts of the project as currently proposed. Attachment 1 and 2 respectively provide detailed comments on the alternatives analysis and cumulative impacts analysis.

¹ 40 CFR Part 230.10(a)

40 CFR Part 230.10(b) and (c) Water Quality and Significant Degradation

The Guidelines state that a discharge of dredged or fill material may not be permitted if it causes or contributes, after consideration of disposal site dilution and dispersion, to violations of any applicable State water quality standards,² or causes or contributes to significant degradation of the waters of the United States.³ The EPA is concerned that the proposed loss of project area floodplain forested wetlands and tributaries would increase nutrient loading and sedimentation, causing or contributing to the significant degradation of Pigeon Creek and ultimately affecting the quality of water of the Ohio River.

The effects of multiple large scale surface mining operations and other stressors have increasingly taken a toll on Pigeon Creek. The loss of nearly 500 acres of floodplain forested wetlands and 10 miles of streams at the Seven Hills Mine site would add to the nearly 400 acres of wetlands and 10 miles of stream impacts that have already been permitted for surface coal mining operations within the Highland-Pigeon Creek watershed in the last 8 years. The total wetland impact proposed for the Seven Hills Mine site is larger than the total wetland impacts for all permitted coal mines in the Highland-Pigeon Creek Watershed. Results from initial water quality modeling conducted by the EPA show increased sediment and nutrient loading to Pigeon Creek and the Ohio River based on the loss of wetlands just within the Seven Hills Mine site footprint. Where Pigeon Creek joins the Ohio River, nutrient loads increase by over 3,500 pounds annually and sediment loads increase by over 260,000 pounds annually.

The EPA's concerns regarding impacts to water quality are further heightened by the State of Indiana's list of impaired waters, which identified biotic communities in Pigeon Creek as already being impacted by low dissolved oxygen and high nutrient levels.⁴ Furthermore, given the algal issues in the Ohio River in 2015, the EPA is concerned about possible effects in the Ohio River with respect to safe drinking water and recreation. We would like to continue working with you to identify effective measures to better ensure protection of water quality, consistent with the Guidelines. Additional discussion regarding water quality concerns is provided in the attachments.

40 CFR Part 230.91-98 Compensatory Mitigation

The EPA is concerned that, based on the past performance of compensatory mitigation efforts in nearby watersheds, proposed efforts to create or restore forested wetlands on recently mined land may not be successful in supplying the suite of important water quality, flood water attenuation and habitat functions that existing floodplain forested wetlands currently provide. For example, efforts to restore floodplain forested wetlands associated with the North Millersburg Mine failed because the finished topography on much of the reclaimed area was too high in elevation to function as floodplain forest. That area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The EPA recommends that the mitigation

² 40 CFR Part 230.10(b)

³ 40 CFR 230.10(c)

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMDL Development Schedules

May. 2. 2016 2:52PM

US ARMY CORP NEWBURGH REGULATORY

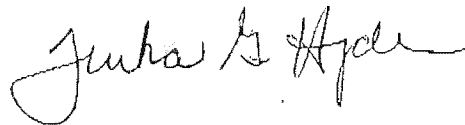
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plan be revised to ensure consistency with the requirements of the Federal Mitigation Rule. The plan should identify appropriate performance standards, monitoring and adaptive management to determine if the mitigated wetlands are developing into the desired resource type and providing the expected functions. The plan also needs to include financial assurances to guarantee the long term management and potential for corrective action of the mitigation sites. Attachment 3 includes detailed comments regarding mitigation.

In light of these concerns, the EPA believes that the project may have substantial and unacceptable impacts on aquatic resources of national importance pursuant to Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

Thank you for the opportunity to provide comments on this project. Please contact Wendy Melgin at (312) 886-7745 with any questions you may have or to schedule additional discussions.

Sincerely,



Tinka G. Hyde
Director, Water Division

Attachments

Overall Project Comments
Cumulative Impacts
Mitigation

Enclosures

March 17, 2016 USEPA and FWS letter
Millersburg II Mine Documents

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)
Scott Pruitt, US Fish and Wildlife Service (via email)
Martha-Clark Mettler, IDEM (via email)
David Carr, IDEM (via email)

May. 2. 2016 2:52PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 6

Attachment 1
Overall Project Comments

Attachment 1 - Overall Project Comments

General Comments

Section 404 of the CWA requires applicants to provide enough detail in the application to determine compliance with the Section 404(b)(1) Guidelines (the Guidelines).¹ The amount of effort and detail in the analysis should be commensurate with the level of aquatic resources impacted. While United Minerals has revised its preliminary application from previous submittals, the project fails to comply with the Guidelines in that the applicant has not demonstrated the project is the least environmentally damaging practicable alternative (LEDPA). While EPA believes the proposed project is not the LEDPA and may cause significant degradation, the application also lacks sufficient information to make a reasonable judgement that the discharge will comply with the remainder of the Guidelines' requirements. For example, United Mineral does not account for secondary impacts or provide detailed mining plans. Additionally, the proposed project fails to include all appropriate and practicable measures to minimize harm to the aquatic environment as specified in this attachment. As such, the EPA requests that the Corps deny the permit. If the Corps does not intend to deny the permit, EPA continues to recommend that an environmental impact statement (EIS) be prepared. An EIS will allow the Corps to identify the full range of alternatives, environmental impacts and mitigation opportunities.

Floodplain forested wetlands are a transitional habitat between the river or stream and upland and serve as a wildlife corridor between habitats. Nutrients are exchanged in these wetlands, with floodwater depositing silt and nutrients and the upland contributing leaf litter and runoff. The fluctuating water levels and nutrient rich soils make these wetlands highly diverse and excellent habitat for aquatic and terrestrial wildlife. Furthermore, floodplain forested wetlands provide services that cannot easily be duplicated by man-made facilities. During heavy rainfall, these wetlands divert, store, and slow the flow of water to reduce flood damage downstream, filter nutrients (especially nitrogen and phosphorus) and sediments from water flowing through them, sequester carbon dioxide and act as a sink for carbon.

The loss of over 500 acres of wetlands performing the services listed above may have a detrimental effect on water quality and may cause or contribute to a violation of state water quality standards.² On Indiana's 303(d) list of impaired waters, Pigeon Creek is listed as impaired for *E. coli*, dissolved oxygen, impaired biotic communities and nutrients, and the Ohio River is listed as impaired for *E. coli*, dioxin, total mercury and PCBs.

Assessment of Impacts

Although United Minerals accounts for direct and cumulative impacts associated with the proposed project, secondary impacts are not addressed as required by the Guidelines.³ Additionally, United Mineral's proposed compensatory mitigation accounts for only direct impacts. Comments on Cumulative Impacts and Mitigation are addressed in separate attachments (Attachments 2 and 3).

¹ 40 CFR 230.12

² 40 CFR 230.10

³ 40 CFR 230.11

Attachment 1 - Overall Project Comments

Secondary Impacts

Secondary impacts on an aquatic ecosystem are associated with the discharge of dredged or fill material, but do not result from the actual placement of the dredged or fill material.⁴ EPA believes all the wetlands United Mineral labeled "avoided" along the west bank of Pigeon Creek as well as, the wetlands and streams which extend off site to the west of the project limits, will be subject to secondary impacts from this project. Within the project area alone, this includes over 200 acres of wetlands and over 13,000 linear feet of stream.

The floodplain forested wetlands to the west of Pigeon Creek are part of both palustrine and riverine systems; they receive hydrologic inputs from surface water, groundwater and flood events. Similarly, the streams on the project area receive the same hydrologic inputs as the wetlands through which they flow. The proposed mine pit will bisect the floodplain forested wetlands, severing the tributary streams to the west of Pigeon Creek from their headwaters and diverting flood waters to the east of Pigeon Creek. During mining operations, the mine pit will be dewatered and ground water levels will be drawn down and locally reduced. Roadways and conveyer systems within the project area may also cause secondary impacts. At a minimum, the secondary impact assessment should include a review of impacts to the following hydrologic sources:

Reduction of surface water sources

- Wetlands and streams within the buffer on the west bank of Pigeon Creek
- Wetlands bisected by roads/conveyor systems that connect Seven Hills to High Point

Reduction of flood sources

- Wetlands and streams within the buffer on west bank of Pigeon Creek

Reduction of ground water sources

- Wetlands and streams within the buffer on the west bank of Pigeon Creek
- Pigeon Creek baseflow
- Wetlands and streams that extend offsite to the west of the proposed project

United Minerals should also describe how the water within the mining pit will be handled during all phases of the operations.

Plans "Subject to Change"

It is difficult to accurately assess impacts to aquatic resources and provide meaningful comments when United Minerals has stated multiple times within the application that the impacts, and even the reason for impacts, may change. United Minerals states on page 1 the "disturbances may include, but are not limited to, surface mining, coal haulage and access roads, coal processing, storage and loadout facilities, mine management, maintenance and support facilities, and topsoil and subsoil piles." United Minerals further states that its Operations Map on page 1 is "the general operations plan and is subject to change." United Minerals states on page 3 of its application that the post-mining land uses are "subject to change due to property owner waivers and modifications to the mining plan but are current as of May 2015." Similarly, following the

⁴ 40 CFR 230.11(h)

Attachment 1 - Overall Project Comments

impacts table on page 19, United Minerals states "[t]he above impacts are based on the current operations map, which is subject to change as mining commences."

With both the impacts and the post-mining landscape "subject to change," EPA cannot make a reasonable judgement as to whether or not the proposed discharge will comply with the Guidelines and cannot determine if the proposed discharge includes all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem as required by the Guidelines.⁵

For example, there are two haul roads labeled on the operations map which extend to the east over Pigeon Creek and impact wetlands on the west side of Pigeon Creek. However, within Appendix A of the application there are crossing designs which indicate the northern crossing is proposed as a conveyor system and the southern crossing is identified as a bridge crossing; not two haul roads as indicated on the Operations Plan. Also, designs and engineered drawings are not provided for the remainder of the haul road or conveyor system as it extends east towards the proposed High Point Mine (LRL-2013-444-rjb). The construction and design of these features could include diversion ditches and culverts for the haul road or the conveyor as it extends through wetlands on the Seven Hills Mine onto the High Point Mine. The inclusion or exclusion of these features could change the amount of direct and secondary impacts from the construction of features through the middle of wetlands. Further, United Minerals has not discussed why all the haul roads and the conveyor system are necessary and why alternative designs or points of ingress or egress are not possible. United Minerals has not discussed why impacts to aquatic resources which allow direct access to the High Point Mine are needed, as the processing plant is planned on the Seven Hills mine. This further underscores the recommendation highlighted below and in the March 17, 2016 joint EPA/FWS letter (Enclosure 1) that the two mines be treated as a single project.

United Minerals does provide a general discussion on mining reclamation methods in the Midwest and general statements on the effects of mining, such as on soil infiltration, ground water recharge, and increased base flow. However, it is not clear in the Land Use section which reclamation methods would be used on site and if all of the effects of mining are anticipated. United Minerals needs to discuss the specific reclamation methods proposed and describe specific impacts to soil infiltration, ground water recharge, and increased base flow.

Independent Utility

As EPA and FWS highlighted in the March 17, 2016 joint letter, the Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine, which is also operated by United Minerals. United Minerals' Surface Coal Mining and Reclamation Act permit from Indiana Department of Natural Resources (IDNR) overlaps with the High Point Mine's boundary. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine are also described in the High Point Mine application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would have independent utility.

⁵ 40 CFR 230.12

Attachment 1 - Overall Project Comments

As discussed above, there are two haul roads which connect the Seven Hills Mine and the High Point Mine. Both mines have proposed utilizing separate coal processing plants. Had United Minerals submitted these mines together, the review of the project for compliance with the Guidelines could have considered additional ways to minimize impacts and even potential on-site mitigation opportunities through preservation, enhancement, and restoration.

Therefore, the EPA continues to request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosure 2).

Aquatic Resources of National Importance

EPA is concerned that the project's proposed CWA Section 404 discharges may result in unacceptable adverse impacts to the Ohio River, Pigeon Creek and its floodplain forested wetlands. EPA considers Pigeon Creek, its floodplain forested wetlands and the Ohio River all Aquatic Resources of National Importance (ARNI). The forested floodplain forested wetlands along Pigeon Creek are an important and productive habitat. In addition to the habitat value of natural areas, floodplain forested wetlands serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by attenuating and storing floodwater. These wetlands improve water quality by filtering nutrients, processing organic material, and reducing sediment loads before Pigeon Creek discharges into the Ohio River.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain IDNR wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles, bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the Wabash-Erie Canal and a portion of Pigeon Creek on-site is part of the former canal. Today, the Creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as "an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

Attachment 1 - Overall Project Comments

environment.”⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed protect the quality of the Ohio River from nonpoint source pollution caused by urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River flows 981 miles to Cairo, Illinois, where it discharges into the Mississippi River. The Ohio River flows through or borders six states: Illinois, Indiana, Kentucky, Ohio, Pennsylvania, and West Virginia. Nonpoint source pollution from urban runoff, agricultural activities, and abandoned mines is a major cause of water pollution in the Ohio River. By volume, the Ohio River is the largest contributor of flow to the Mississippi River. The river itself provides drinking water, hydroelectric energy, shipping routes to the Mississippi, recreation and fishing. Several fish consumption advisories currently exist for the Ohio River.⁸

Significant Degradation

The preamble to the Guidelines states that discharges may not be permitted if they will have a “significantly” adverse effect on various aquatic resources. In this context, “significant” and “significantly” mean more than “trivial.”

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such changes can result in major impairments of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.⁹ See Attachment 2 - Cumulative Impacts for a discussion. As stated above, United Minerals does not analyze or discuss secondary impacts within the permit application. This analysis and discussion needs to be added to the application.

During mining, sediment concentrations and load rates increase dramatically compared to the pre-mining condition.¹⁰ Total suspended solids and total dissolved solids are likely to increase. Increased erosion associated with mining can alter streamflow and transport sediment and pollutants, which adversely affect downstream aquatic ecosystems. Studies have found that more frequent, higher daily flow volumes occur during the active phases of mining compared to pre-mining conditions.¹¹ This is attributable to the loss of vegetative cover that normally reduces runoff volumes and promotes infiltration. As such, the proposed loss of nearly 500 acres of forested wetlands from this project will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of

⁷ <http://www.evansville.gov/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

⁹ 40 CFR 230.11(g)

¹⁰ Bonta, James V., 2000. “Impact Of Coal Surface Mining And Reclamation On Suspended Sediment In Three Ohio Watersheds.” *Journal of the American Water Resources Association (JAWRA)* 36(4): 869-887.

¹¹ Bonta, James V., C. R. Amerman, T. J. Harlukowicz, and W. A. Dick, 1997. Impact of Coal Surface Mining on Three Ohio Watersheds-Surface-Water Hydrology. *Journal of the American Water Resources Association (JAWRA)* 33(4): 907-917.

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water to the Ohio River. As stated above, both Pigeon Creek and the Ohio River are listed on Indiana's list of impaired waters for various pollutants. The Ohio River experienced algal problems in 2015, which raises concerns about the possible effects to safe drinking water, wildlife and recreation (see Enclosure 1).

In addition to localized impacts to water quality, the increase of nutrients, and specifically nitrogen, in the watershed has had a demonstrated effect on water quality. The United States Geologic Survey (USGS) published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The USGS identified the Highland-Pigeon Creek watershed as one of the watersheds that contributes more than 90% of its nitrogen to the Gulf.¹² EPA's initial Soil Water Assessment Tool (SWAT) modelling results, which do not include cumulative impacts of mining, indicate that the loss of the wetlands along Pigeon Creek would increase nutrient and sediment loads to the Ohio River by an annual amount of over 3,500 pounds and over 260,000 pounds respectively (see Enclosure 1).

Section 404(b)(1) Guidelines Analysis

EPA has serious concerns with the project as proposed due to the availability of less damaging practicable alternatives, the inadequacy of avoidance and minimization measures, failure to consider any secondary impacts, and an inadequate compensatory mitigation proposal. Detailed comments on cumulative impacts and the proposed mitigation are included in Attachment 2 – Cumulative Impacts and Attachment 3 – Mitigation respectively.

Least Environmentally Damaging Practicable Alternative

In accordance with 40 CFR 230.10(a) "...no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the impact does not have other adverse environmental consequences." Based on the information provided by United Minerals, the applicant has not demonstrated that this site is the LEDPA. Identification of the LEDPA is achieved by performing an alternatives analysis that estimates the direct, secondary, and cumulative impacts to jurisdictional waters resulting from each alternative considered.

United Minerals estimates in the application that the Seven Hills Mine has ~12 million recoverable tons of coal valued at \$480 million. The discussion on page 35 of United Minerals' application highlights that 17 billion tons of recoverable coal remain in Indiana and 130 billion tons occur within the Illinois Coal Basin, which includes Indiana coal. United Minerals then states that the Indiana reserves would maintain the State of Indiana's current extraction rate for 500 years and separately the entire Illinois Coal Basin could meet the United States coal demands for over 100 years based on current extraction rates. With such large reserves remaining in Indiana alone, it is reasonable to consider that less damaging alternatives exist within the basic project purpose to mine coal in Indiana, although United Minerals' broader stated purpose which is to "produce bituminous coal by surface mining methods to contribute to power production for the United States." As the Guidelines provide a rebuttable presumption that less damaging practicable alternatives exist, United Minerals should provide a comparative

¹² Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

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evaluation of the environmental impacts associated with additional alternatives within the same coal basin that would meet the basic project purpose and entail recovery from other coal reserves and holdings that it owns or that could reasonably be obtained through a parent company or other contractual relationships.

Avoidance and Minimization

Avoidance and minimization of impacts are evaluated during the sequencing required by the Guidelines.¹³ In order to comply with the Guidelines, the applicant must demonstrate that all practicable steps have been taken to avoid and minimize unavoidable impacts to the maximum extent possible and finally, to compensate for any unavoidable losses.

As stated above, the general nature of the operations plan and United Minerals' uncertainty of impacts impedes the review of the proposed project and precludes meaningful comments on minimization efforts. While United Minerals incorporated a physical buffer to Pigeon Creek as a minimization measure, it did not analyze or address the secondary impacts that would occur to those waters in the "buffer" along Pigeon Creek. Likewise, the application does not contain any specific designs of attendant features. Nor does the application contain a discussion on why haul road and conveyor belt access is needed between the two mines and why those features had to be placed through wetlands and not configured differently to avoid or reduce impacts to aquatic resources. Further, United Mineral did not describe or discuss how water pumped from the pit would be handled and discharged. If a direct discharge from the pit to a water of the US is proposed, a Clean Water Act section 402 National Pollution Discharge Elimination System permit would be required. EPA is not aware of any applications submitted to the Indiana Department of Environmental Quality by United Minerals for this project to date.

Environmental Justice Analysis

EPA's comments are pursuant to Executive Order (E.O.) 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) and E.O. 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*). The applicant's determination that there are no disproportionately high and adverse impacts to communities with EJ concerns is premature, given the inadequacy of the data, analysis, and conclusions presented by United Minerals.

Inadequate data

For EJ analyses, EPA recommends the use of Census tract-level data when available and where appropriate, as opposed to county-level data. Census tract-level data is readily available from the U.S. Census Bureau American Community Survey (ACS) 2008-2012 five-year summary data. Typically, use of coarser data (such as county level) can mask pockets or artificially dilute presence of vulnerable populations that could potentially be impacted by the project. Using EJSCREEN,¹⁴ EPA determined that potential disproportionate impacts to vulnerable populations near the project area may occur as a result of the proposed project (see discussion below regarding impacts to children under the age of five). If the applicant continues to rely on county-level data for the appropriate geographic unit of analysis, EPA recommends it provide a rationale

¹³ 40 CFR 230.10(d)

¹⁴ EPA's publicly-available EJ analysis tool (<https://www.epa.gov/ejscreen>)

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defending this decision in its permit application or future modifications to the current application.

In addition to providing demographic data at the Census tract level, EPA also recommends the applicant include both maps and tables with raw data, in addition to percentages for the Census tracts that may be directly or indirectly impacted as a result of the proposed project. Maps, particularly at the Census-tract level, help demonstrate a spatial relationship between potential impacts and affected communities.

EPA notes that the unassigned table on page 54 includes percentages of "*white alone, not Hispanic or Latino*," but does not include a breakdown of data on minorities in the area. EPA recommends including data pertaining to minority populations in the project area, including raw numbers and percentages.

Analysis and Premature Conclusions

Per E.O. 13045, analysis and disclosure of potential effects to young children is necessary because some physiological and behavioral traits of children render them more susceptible and vulnerable than adults to environmental health and safety risks. Children may be more highly exposed to contaminants because they generally eat more food, drink more water, and have higher inhalation rates relative to their size. They may be more vulnerable to the toxic effects of contaminants because their bodies and systems are not fully developed and their growing organs are more easily harmed. The applicant has already identified that Warrick County, Indiana, exceeds the state and national percentages for persons under the age of 18, and its analysis assumed that this was because higher populations of children live in larger populations centers, some four miles away from the proposed site. However, EJSCREEN reveals a high number of children under the age of 5 in one of the Census tracts within the project area. Therefore, the analysis should include information on potentially adverse impacts to children as a result of the proposed project.

The project area is in attainment for all six commonly found air pollutants (also known as "criteria pollutants"). However, EJSCREEN reveals elevated levels of annual fine particulate matter (PM_{2.5}). EPA is concerned that continued release of air pollutants as a result of the proposed project, including PM_{2.5}, will potentially cause adverse impacts to vulnerable populations, such as children under the age of five (see above documentation that vulnerable populations exist in project area). According to EPA's *America's Children and the Environment*¹⁵ report, exposure to particulate matter aggravates respiratory and cardiac functions. In children, this translates to decreased lung function growth, exacerbation of allergic symptoms, and increased respiratory problems. EPA recommends the applicant provide an analysis that addresses potentially continued or increased impacts as a result of the proposed project to children under the age of five.

Based on the inadequacy of the alternatives analysis discussed above, EPA is unable to determine whether other alternatives have less impact on communities living with BJ concerns. We believe United Minerals' determination that there are no disproportionately high and adverse

¹⁵ <https://www.epa.gov/ace>

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impacts as a result of the proposed project is premature and not supported by the provided data and analysis.

CWA Section 404 Corps' Public Interest Review

Within the Section 404 permit review, the Corps must take an applicant's purpose and need into account during their public interest review.¹⁶ The applicant's stated purpose and need is an expression of the underlying goals for the proposed project.

EPA is concerned that United Minerals has not provided information to demonstrate project need, which should consider the current demand, market conditions, and currently available coal from other sources. The application states that mining will be based on market conditions, but does not substantiate that there is a market demand as discussed in the application on demand, usage and production are based on various data from 2009 through 2011.

Indiana coal production is down 7.2% over the previous year.¹⁷ This drop in production can be attributed to a decrease in coal demand domestically as well as globally. U.S. coal consumption decreased 11% between January and July of 2015, with coal electricity generation falling to 36% of total generation, down from 50% ten years ago.¹⁸ Reuters reported in November 2015 that in September 2015, natural gas surpassed coal as the leading power source in the U.S.¹⁹ Overseas, China's imports have fallen by 31% and use has declined by 5% between January and August 2015.² Lenders have also recognized the decline in coal. Major banks, such as Wells Fargo, Morgan Stanley, Bank of America, and Citigroup have all vowed to cut financing to coal mining projects due to both their adverse effects on the global climate as well as low expectations for a rise in future coal mine demands.²⁰

The coal reserves in the proposed mine are owned by Peabody and Alcoa. The application should analyze both companies' current demand, the coal tonnage at current stockpiles, and the coal reserves at operating mines. EPA notes that there are other coal companies in southern Indiana that are managing excess coal from currently operating mines. For example, on November 3, 2015, it was reported that nearby Duke Energy in Indiana was attempting to reduce its current stockpiles through deferment of contracts and resale.²¹

In light of these factors, the applicant needs to clearly demonstrate the need for the project.

¹⁶ 33 CFR 320.4 (a)(2)(i)

¹⁷ <http://coalvalleynews.com/news/business/1151/u-s-coal-production-continues-to-trend-below-2014>

¹⁸ http://www.huffingtonpost.com/entry/coal-consumption-decrease-greenpeace-study_5640b6c7e4b0411d3071a07d

¹⁹ <http://www.reuters.com/article/2015/12/01/us-usa-natgas-coal-idUSKBN0TK52K20151201#QsvZvstB2ZtGibCR.97>

²⁰ <http://money.cnn.com/2015/12/01/investing/paris-climate-talks-wall-street-banks-coal/>

²¹ <http://www.platts.com/latest-news/electric-power/louisville-kentucky/duke-energy-indiana-defers-coal-deliveries-as-21405101?hooptid=a0ccf05c4cf633c79f1febdd0359e39b>

Attachment 1 - Overall Project Comments

Specific Comments

Below are comments on specific statements made by United Minerals in its application:

Land Use - Page 3

The following post-mine land uses are subject to change due to property owner waivers and modification to the mining plan but are current as of May 2015.

As discussed above, the lack of certainty on the post mining landscape and potential modifications to the mining plan make it difficult to accurately assess direct, secondary and cumulative impacts. Based on the proposed changes in the location of the aquatic resources in the post-mine landscape shown on the Mitigation Map, United Minerals does not propose to reestablish the connections between the offsite wetlands and the proposed forested wetlands. This segregation of resources offsite should be accounted for when assessing secondary impacts.

Land Use - Page 4

Coal mining in the Midwest utilizes water control structures such as terraces which in turn slows the runoff velocity. This significantly reduces erosion and transport of suspended solids as compared to typical runoff in areas with an agricultural land use. Site reclamation produces topographic relief consistent with the local area and incorporates many erosion control methods such as terracing and dry-dam structures to control runoff velocity.

While United Minerals characterizes some mining reclamation practices in the Midwest, it does not discuss which reclamation and erosion control practices would be applied on site nor where those practices would be applied. For example, United Minerals discussed water control structures that include terraces and dry dams; however, given the project's location in the floodplain of Pigeon Creek, is not clear if these techniques would be used or where they would be located. The application and location of these practices could affect the amount of secondary impacts and impacts to downstream water quality.

Groundwater - Page 24

There are no known residential groundwater wells or wellhead protection zones that exist in or within 1,000 feet of the permit area. The so called residential water wells in the area are wells in name only, in that the originally manually dug cavities that were constructed as water wells, have out of necessity been converted to cisterns, or simple underground storage vessels. These vessels are regularly refilled with water obtained from the local public utility and hauled to each specific site by tanker trucks.

EPA is concerned about the water wells that may be affected despite United Minerals' reference to "so called drinking water wells." Based on United Minerals' narrative, it is not clear how many of these wells would be impacted and what their purpose is (i.e. drinking water, agriculture, and industrial). These features should be quantified and assessed for impact under the Corps' Public Interest Review.

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Groundwater -- Page 51

Mining and mine reclamation result in increased soil infiltration... Mined soils function as a groundwater storage system that slowly release infiltrated water resulting in diminished flooding downstream... In lower elevations, actual base flows could be sustained or elongated depending on the permeability of the spoil.

EPA believes that if an increase in baseflow occurs post mining, an increase in TDS and other minerals will also occur due to the infiltration of water through mine spoils. Given the proximity to downstream waters, EPA does not agree that impacts will be isolated to the immediate mined area as United Minerals asserts on page 4. This secondary effect on groundwater chemistry and change in base flows should be quantified and mitigated.

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Attachment 2

Cumulative Impacts

Attachment 2 – Cumulative Impacts

Cumulative Impacts – Overall Comments

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines,¹ the applicant should prepare a cumulative impacts analysis that details the changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct, cumulative and secondary impacts from previous and current actions, as well as impacts to surface and ground water hydrology from future actions. As indicated in Attachment 1, General Comments, United Minerals does account for cumulative impacts associated with the proposed project, but secondary impacts are not addressed in the revised application as required by the Guidelines.²

Cumulative impacts are required as part of the factual determinations required under the Guidelines.³ Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.⁴ In the revised application, United Minerals provides an assessment of the Clear Branch-Pigeon Creek Watershed (i.e. 12-digit Hydrologic Unit Code (HUC) watershed scale). However, EPA believes the scope of United Minerals cumulative impact assessment needs to be revised because the assessment is focused on the smaller watershed and not the entire Highland-Pigeon Creek watershed.

Scope of Cumulative Impacts Assessment

As mentioned in Attachment 1, General Comments, EPA used the Soil and Water Assessment Tool (SWAT) model, to assess the 8-digit HUC Highland-Pigeon Creek watershed. The initial modelling results indicated that project impacts would have a measurable effect on both Pigeon Creek and the Ohio River. This was a conservative estimate because modelling did not include data from the Indiana Department of Natural Resources (IDNR) indicating that past mining impacted 26.4% of the Indiana portion of the Highland-Pigeon Creek watershed. Including these additional impacts into the model would have increased the effect of cumulative impacts on downstream water quality. Table 1 and Figure 1 illustrate the locations of past mining.

¹ 40 CFR 230.11(g)

² 40 CFR 230.11(h)

³ 40 CFR 230.11 (g)

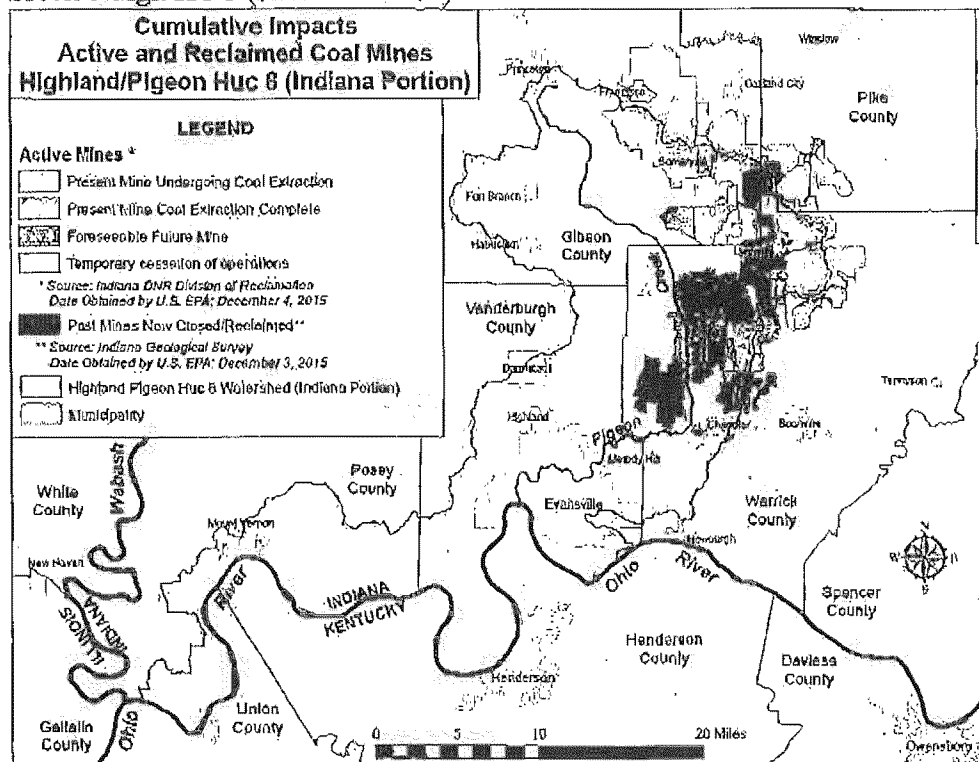
⁴ 40 CFR 230.11(g)

Attachment 2 – Cumulative Impacts

Table 1. Acreage and square mile summaries of the cumulative footprints of various stages of mining activities in the Highland-Pigeon Creek watershed (8-digit HUC 05410202)

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Total	62,208	97

Figure 1. Cumulative Impacts of Active and Reclaimed Coal Mines in the Highland-Pigeon Creek 8-digit HUC (Indiana Portion)



EPA believes that United Minerals' narrow focus on the Clear Branch-Pigeon Creek is not adequate to assess the cumulative impacts of surface coal mining. The effects on the downstream portions of Pigeon Creek and the Ohio River justify including the entire Indiana portion of the Highland-Pigeon Creek watershed into a revised cumulative impacts assessment.

Significant Degradation

Although the cumulative impacts analysis needs to be revised to include the larger watershed, United Minerals' assessment estimated that several thousand acres of wetlands were impacted from past mining activities. United Minerals went on to state in its assessment that there is the

Attachment 2 - Cumulative Impacts

potential for hundreds of additional acres of wetland impacts from future mining in the Clear Branch-Pigeon Creek Watershed alone.

United Minerals' cumulative surface effects summary within the Clear Branch-Pigeon Creek Watershed on page 39 of the application:

12-Digit Cumulative Surface Effects Summary							
Watershed	Watershed Area	Previously Affected by Mining	Watershed Previously Affected by Mining	Currently Affected by Mining	Watershed Currently Affected by Mining	Potentially Affected by Mining	Watershed Potentially Affected by Mining
	(acre)	(acre)	(percent)	(acre)	(percent)	(acre)	(percent)
Clear Branch-Pigeon Creek	22,960	10,940	47.7	155	0.7	4,062.5	15.2

United Minerals' estimate of impacts within the Clear Branch-Pigeon Creek Watershed on page 40 of the application:

Estimated Stream and Wetland Impacts from Past Mining			
Watershed	Previously Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	10,940	153,160	2,286.5

United Minerals' estimate of future impacts within the Clear Branch-Pigeon Creek Watershed on page 40 of the application:

Estimated Stream and Wetland Impacts from Potential Mining			
Watershed	Potentially Affected by Mining	Estimated Stream Impacts	Estimated Wetland Impacts
	(acre)	(feet)	(acre)
Clear Branch-Pigeon Creek	4,062.5	153,160	700

The tables above, provided by the applicant, demonstrate that, even without considering the cumulative or secondary impacts within the context of the larger Highland-Pigeon Creek watershed, the loss of streams and wetlands tributary to Pigeon Creek has been substantial. Therefore, the continued loss of these resources, as a result of the proposed project, may cause or contribute to the significant degradation of Pigeon Creek. The preamble to the Guidelines states that discharges may not be permitted if they will have "significantly" adverse effects on various aquatic resources. In this context, "significant" and "significantly" mean more than "trivial."

Characterization of the Timing of Coal Mining Impacts

In the application, United Minerals stated that coal mining activity in Warrick County dated back to the 19th century. However, a review of historic United States Geologic Survey (USGS) Maps indicates that surface coal mining within the Highland-Pigeon Creek watershed occurred primarily after 1963. The three maps below show previous surface mining in the Highland-Pigeon Creek watershed, existing surface mining, the location of the proposed Seven Hills and High Point Mines, and the location of impaired reaches on Pigeon Creek.

Attachment 2 – Cumulative Impacts

Figure 2

Locations of Surface Mining in the Highland-Pigeon Creek Watershed (1960-1967)

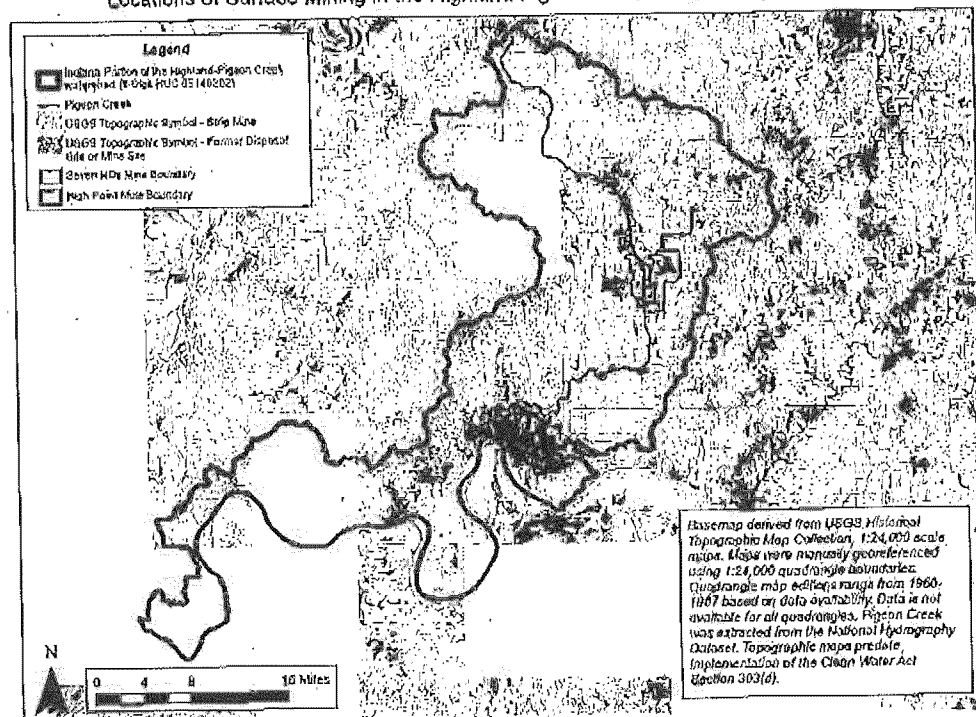
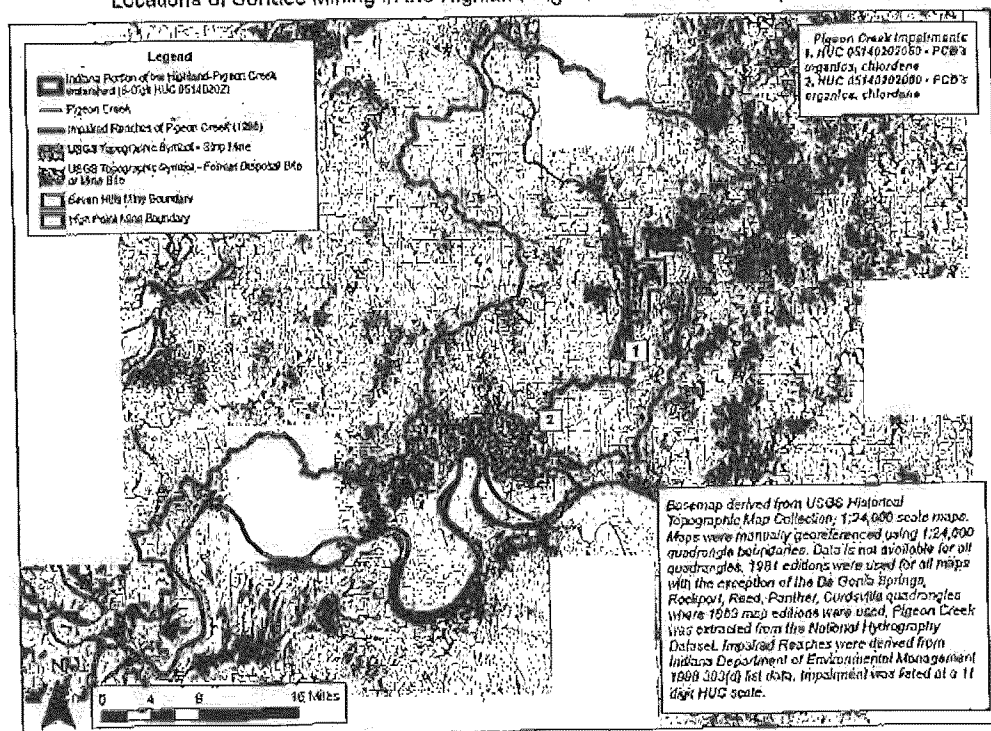


Figure 3

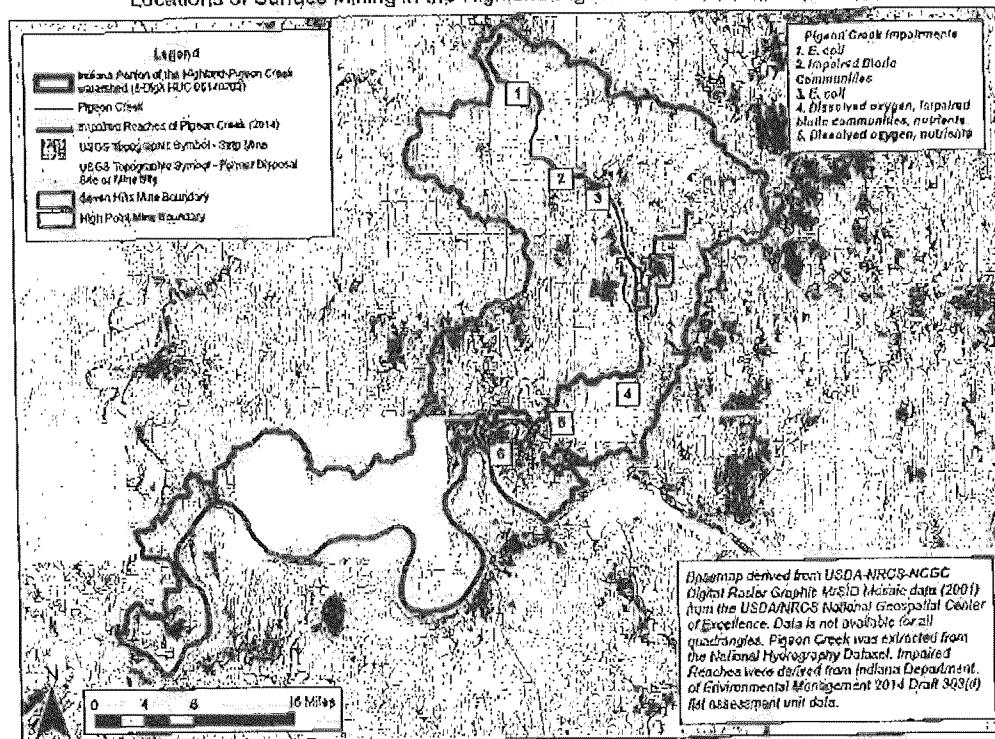
Locations of Surface Mining in the Highland-Pigeon Creek Watershed (1981-1983)



Attachment 2 – Cumulative Impacts

Figure 4

Locations of Surface Mining In the Highland-Pigeon Creek Watershed (2001)



The increase in mining operations in the watershed from the 1960's to present day contributed to the impairment of Pigeon Creek downstream of mining activities. It is important to note that the reach of Pigeon Creek bordered by floodplain forested wetlands is considered unimpaired, as shown on IDEM's online 303(d) Tool.⁵ However, IDEM is currently considering listing that portion of Pigeon Creek downstream of the proposed project for total dissolved solids, *E. coli*, nutrients, and dissolved oxygen. The changes in impairments downstream of mining activity supports EPA's position that the proposed mine may significantly affect Pigeon Creek.

Intensity of Contemporary Impacts

Table 2 shows direct mining impacts over the past 8 years in the larger Highland-Pigeon Creek watershed. EPA found that direct impacts to 352.67 acres of wetlands and 527,689 linear feet of streams were authorized by the Corps through CWA Section 404 Individual permits for surface coal mining operations. The most recent impacts were authorized by the Corps in February of 2016. While EPA does not believe the cumulative impacts analysis should be limited to the past 8 years, we note that 24.9% of the 56,299 acres of land affected by surface coal has been permitted within that time frame.

⁵ <http://www.in.gov/idem/nps/pages/e303d/index.html>

Attachment 2 – Cumulative Impacts

Table 2 Direct Mining Impacts in Highland-Pigeon Creek Watershed

Mine	Corps Project #	Mine area (ac)	Total Wetlands (ac)	Total Stream (lf)
Liberty	LRL-2010-218-gjd	1,646	105.8	20,343
Liberty Amendment	LRL-2014-336-gjd	136	34	5,035
Wild Boar	LRL-2008-228-gjd	8,853	145.33	346,309
Somerville South Amendment 2	LRL-2010-00953-r9r	946	27.87	37,365
Somerville South Amendment 3	LRL-2013-0423-sew	1,746	33.07	84,353
West 61 North Amendment	LRL-2007-1330-A-gjd	233	6.5	11,889
Cardinal Mine	LRL-2009-937-rjb	439	0.1	22,395
Total		13,999	353.07	527,689

The two Liberty Mines are located to the south and east of the proposed Seven Hills Mine. The Liberty mine permits, shown in Table 2, authorized impacts to 139.8 acres of wetland and 25,378 linear feet of stream. Table 3 highlights the additional wetland and stream impacts which may result from the proposed High Point Mine and Seven Hills Mine. These three adjacent mines would cumulatively impact over 135,000 linear feet of streams and nearly 700 acres of wetlands, with the vast majority of impacts occurring within the Clear Branch-Pigeon Creek watershed. The combined footprint of the three mines would cover 18,762.6 acres, or 28.5% of the Clear Branch-Pigeon Creek subwatershed and 7.9% of the larger Highland-Pigeon Creek watershed.

Table 3 Direct Impacts Proposed for Seven Hills Mine and High Point Mine

Mine	Mine area (ac)	Total Wetland Impacts (ac)	Total Stream Impacts (lf)
Seven Hills	1,678.6	510.16	53,840
High Point	3,085	45.7	59,347
Total	4,763.6	555.86	113,187

While there have been large impacts in the watershed during the past 8 years, the total wetland impact for Seven Hills is more than all the recently permitted coal mines combined in the Highland-Pigeon Creek watershed. This would be the single largest wetland complex proposed for impact in the southern Illinois Basin within the last eight years. EPA believes that the Seven Hills Mine may cause or contribute to the significant degradation already expressed in both the Clear Branch-Pigeon Creek and Highland-Pigeon Creek watersheds, and that those impacts may have a detrimental effect on the water quality of Pigeon Creek and downstream waters.

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US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 25

Attachment 3

Mitigation

Attachment 3 -- Mitigation

Compensatory Mitigation Plan

United Minerals proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 27.13 acres palustrine emergent, 19.81 acres of palustrine scrub-shrub, and 1.04 acres of palustrine unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial streams using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a Clean Water Act (CWA) Section 404 permit review.¹ An in-depth discussion regarding mitigation is premature without a demonstrated need for the project and subsequent determination of measures to avoid and minimize impacts to streams and wetlands. However, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following comments at this time.

United Minerals' compensatory mitigation plan (the plan) does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, the analysis needs to factor in the impacts from these mines when planning mitigation.

The plan does not address all components of a compensatory mitigation work plan as required under the 404(b)(1) Guidelines (Guidelines).² Of the twelve required components of a compensatory mitigation plan, the plan fails to provide the following:

- The manner in which the resource functions of the compensatory mitigation address the needs of the watershed and ecoregion;³
- A description of factors considered when selecting the off-site mitigation site; specifically the practicability of accomplishing self-sustaining aquatic resource restoration and enhancement;⁴
- An adequate description of site protection instruments for the proposed compensatory mitigation sites;⁵
- An adequate rationale for the determination of credit ratios;⁶
- An adequately detailed mitigation work plan which details construction methods, timing and sequence, sources of water including connections to existing waters and uplands, plans to control invasive species, water management plan and a grading plan;⁷
- An long-term management plan;⁸
- An adequate adaptive management plan;⁹ and
- Appropriate financial assurances.¹⁰

¹ 40 CFR 230.91(c)

² 40 CFR 230.94(c)

³ 40 CFR 230.94(c)(2)

⁴ 40 CFR 230.94(c)(3)

⁵ 40 CFR 230.94(c)(4)

⁶ 40 CFR 230.94(c)(6)

⁷ 40 CFR 230.94(c)(7)

⁸ 40 CFR 230.94(c)(11)

⁹ 40 CFR 230.94(c)(12)

¹⁰ 40 CFR 230.94(c)(13)

Attachment 3 – Mitigation

Credit ratios determination

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time of impact and mitigation, the length of time needed for the maturation for forested wetlands, and the risk of failure in establishing forested wetlands. According to national wetland status and trend reports published by U.S. Fish and Wildlife Service, forested wetlands have experienced the greatest decline of all wetland types. More importantly, forested wetlands are extremely difficult to restore/create and take up to 20 years to become fully functional.

EPA recommends that the applicant be required to mitigate for forested floodplain wetlands at a ratio of 4:1. This is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.¹¹ For mitigation to be considered successful, performance standards in the plan would have to be achieved. It is our understanding that neither stream nor wetland hydrology will be re-established until well after the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (as opposed to the mitigation proposed at the "avoided" areas).

Further, the Guidelines indicate that when a functional or condition assessment is not used to determine compensatory mitigation, a minimum 1:1 ratio compensation ratio must be used.¹² As such, the proposed ratio of 0.5:1 for palustrine emergent wetland and palustrine unconsolidated bottomland is not adequate. A rationale for the allocation of ratio's at less than 1:1 is a required component of a compensatory mitigation plan.¹³

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and that success in generating functional lift is often elusive. The U.S. Fish and Wildlife Service asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland and floodplain forested wetlands associated with the North Millersburg Mine. In that case, the finished topography on much of the reclaimed area was too high in elevation to function as floodplain forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments are more comparable to rolling hills than floodplains. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Federal Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally

¹¹ 40 C.F.R. 230.93(f)(2)

¹² 40 C.F.R. 230.93(f)(1)

¹³ 40 C.F.R. 230.94(c)(6)

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done by applying ratios to required compensation so that the amount of compensation will be adequate to offset the authorized impacts, even if the mitigation actions are not 100% successful.

On-site mitigation

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the mine footprint, in addition to the avoided areas to the east of Pigeon Creek. The plan discusses how restoration of wetlands in the avoided area will establish the hydrologic connection between streams and wetlands during periods of overbank flooding. However, it is unclear how this connection will function with the presence of a levee that runs along the east edge of Pigeon Creek, directly west of the other avoidance area on the east side of Pigeon Creek. The floodway modification plan for the area east of Pigeon Creek is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for wetland nutrient cycling and vegetation support for forested wetlands based on the study referenced in the application. Additional clarification is needed on the estimation that the contributing cumulative watershed is 2,500 acres. Overall, the plan does not detail how the proposed stream and wetland mitigation will connect with and benefit aquatic resources adjacent to the permit boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results in re-built streams using soil and material from recently mined areas. It is likely that intermittent and ephemeral streams would not have adequate flow, which will impact existing uses and downstream flow.

Overall, there is a lack of detail on reclamation processes and timelines as these relate to what we understand is a sequentially continuous mining approach. In the application, United Minerals provides a general discussion on mining reclamation methods in the Midwest, and general statements on the effects of mining on soil infiltration, ground water recharge, and increased base flow. However, in the Land Use Section it is not clear which reclamation methods would be used on-site and if all of the effects of mining have been anticipated. The application indicates that mining and reclamation will occur simultaneously as pits are backfilled and re-soiled as the next cut is made; re-soiled areas will then be revegetated, and returned to the approved post-mining land uses.¹⁴ The impacts are proposed to occur over a period of 7 to 8 years; however, the timing and rate of mining will be dependent on market demand fluctuations and geologic conditions.¹⁵ The uncertainty in the timing and rate of mining, and the fact that the Plan and Map will be further subject to change due to property owner waivers and modifications to the mining plan,¹⁶ makes it difficult to determine the direct, secondary and cumulative impacts of the project and adequate compensatory mitigation. United Minerals needs to discuss the specific reclamation methods to be used, and describe specific impacts to soil infiltration, ground water recharge, and increased base flow, as these are critical factors in gauging the success of the proposed on-site compensatory mitigation.

¹⁴ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, A. Project Summary, Page 1.

¹⁵ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, A. Project Summary, Page 1.

¹⁶ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, 3. Land Use and Soils, a. Land Use, Page 3.

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The Mitigation Map details the anticipated post mining reclaimed landscape. Four of the six proposed sediment ponds will be retained as open water mitigation.¹⁷ While sediment ponds were placed and configured to control sedimentation and surface runoff from the area during mining, we do not believe that they will replace the lost functions of floodplain forested wetlands in the post mining landscape. The application states “Generally as a result of federal and state regulatory reclamation requirements, reclaimed sites include mitigated wetlands and streams having increased species and habitat diversity thereby enhancing the ecological function of the area. The post-mine land use of open water will approximate the pre-mine acreage. The additional range of aquatic habitat types as a result of reclamation will be an improvement over existing conditions.”¹⁸ Notwithstanding the applicant’s statement that its mitigation will be an improvement over the existing resources, EPA does not believe this to be the case. Floodplain forests are a transitional habitat between the river or stream and upland and serve as a wildlife corridor between habitats. Nutrients are exchanged in these wetlands, with floodwater depositing silt and nutrients and the upland contributing leaf litter and runoff. The fluctuating water levels and nutrient rich soils make these wetlands highly diverse and excellent habitat for aquatic and terrestrial wildlife. Furthermore, floodplain forested wetlands provide services that cannot easily be duplicated by man-made facilities. During heavy rainfall, these wetlands divert, store, and slow the flow of water to reduce flood damage downstream. Converting wetlands to open water ponds in the post mining landscape leads to a loss of wetland habitat and function and the Guidelines require such loss to be mitigated appropriately.¹⁹

EPA recommends United Minerals explore mitigation options that do not include open water ponds. For example, considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

Off-site mitigation

In addition to the on-site reclamation, United Minerals proposes off-site mitigation on Greathouse Island, an abandoned 608 acre oxbow of the Wabash River, in Posey County, Indiana. The proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 266.3 acres of existing forested wetland. United Minerals proposes to generate 450.1 mitigation credits from this work. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact. While it may provide some benefits to the Ohio River downstream, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. The instability of the proposed site is of concern, as this a remnant meander of the Wabash. The river and its floodplain are part of a dynamic system, largely controlled by upstream perturbations that may work to reactivate former channels and influence channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity. Further, while the objectives of the project are to provide flood, sediment, and nutrient storage to the Wabash River, the applicant did not quantify the level of functional lift to be provided

¹⁷ Appendix A, Map C

¹⁸ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative Section 1: Proposed Impact Site, 3. Land Use and Soils, a. Land Use, Page 4.

¹⁹ 40 CFR § 230.93

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compared to existing conditions. The mitigation plan needs to describe the resources and the functions that exist currently at the site, the ecological lift to the watershed resulting from the mitigation and the long term likelihood of success.

EPA does not support the use of Greathouse Island as off-site mitigation for the proposed mining impacts in the Pigeon-Creek watershed. The proposed mitigation site consists of former agricultural fields with forested wetlands bordering the former meander and portions of the river. The proposed mitigation would be considered vegetative enhancement rather than restoration. The enhancement activities may not prove successful in a system where the applicant indicates "Hydrology is currently sufficient and periodically excessive. Head and backwater flooding, ponding, and high water tables may delay certain activities while simultaneously promote vigorous establishment of target species."²⁰ The enhancement activities proposed do not merit the amount of credit proposed based on the site conditions, and would not compensate for the resources lost due to the project.

Mitigation for Cumulative and Secondary Impacts

United Minerals has failed to account for both cumulative and secondary impacts in its mitigation plan. As discussed in the Cumulative Impacts comments (Attachment 2), multiple mining operations exist at both the 8- and 12-digit HUC watershed. As discussed in the Overall Project Comments (Attachment 1), the wetlands and streams that extend off-site to the west of the project limits and the wetlands labeled as "avoided" along the west bank of Pigeon Creek, may be secondarily affected by this project due to the reduction of surface, flood, and groundwater sources during mining operations. Further, due to the increase in base flow anticipated from increased soil infiltration through mine spoils, there may be secondary effects on groundwater mineralization.

United Minerals indicates that temporal loss will be addressed through the restoration and enhancement activities proposed at the Greathouse Island site. EPA does not consider this to be an appropriate mitigation site for reasons stated above. Further, the application states that completion of the off-site wetland mitigation at Greathouse Island will likely occur by the end of the second growing season following permit issuance and "will occur long before the vast majority of impacts occur at the Seven Hills Mine site."²¹ Considering the life of the mine is 6 to 7 years, approximately 1/3 of the mining impacts will likely be completed before the construction at Greathouse Island is completed. It is unclear if the proposed timetable includes the typical 10 year monitoring required for forested wetland restoration or additional monitoring if the 10 year performance standards are not met (i.e. deemed unsuccessful by the Corps). This timetable may be further extended given the potential adaptive management measures that may be required due to the instability at this site.

Furthermore, recreating streams in a post mining landscape and creating forested wetlands from bare root seedlings is difficult, and delays and obstacles should be expected. Temporal losses take into account activities that will require time for vegetation and hydrology establishment,

²⁰ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative, Section 7: Off-Site Wetland Mitigation Plan, Page 80.

²¹ Seven Hills Mine Clean Water Act Section 404 Permit Application Narrative, Section 7: Off-Site Wetland Mitigation Plan, Page 80.

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stream channel construction, and adaptive management and monitoring. EPA recommends that adequate mitigation for temporal losses be proposed by the applicant.

Other Corps Districts within EPA Region 5 have created and utilized a series of factors and value components to determine compensatory mitigation for temporal loss for both streams and wetlands. The components considered include the length of time between impact and completion of mitigation, the period between mitigation completion and maturity, the extent of long term protection measures in addition to restoration type and buffer work incentives. Based on this work, EPA recommends additional mitigation of 30% of the total impacts to compensate for the temporal loss of streams and wetlands on the site.

EPA recommends United Minerals conduct a thorough hydrologic assessment, including surface water and groundwater modeling and monitoring well installation to determine the extent of cumulative and secondary impacts as a result of the mining operation. EPA recommends compensatory mitigation be required for cumulative and secondary impacts. This additional mitigation could include direct restoration of additional resources off-site, preservation of high quality resources on-site, and special permit conditions requiring additional active or post-reclamation monitoring or study. If monitoring indicates adjacent streams and wetlands are drained or otherwise negatively impacted by the proposed mining activity, compensatory mitigation should be required to offset the reduction of surface and ground water sources contributing the hydrology of the adjacent systems.

Monitoring and Long-term Management

The proposed monitoring plan included with the application is insufficient because it lacks monitoring of specific parameters. The monitoring program for this project must require biological, chemical, and physical assessments throughout mining operations, including: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during mining operations to determine potential impacts to aquatic habitat and downstream water quality; and 3) after the completion of stream and/or wetland restoration and site reclamation activities for a minimum of five years to determine mitigation success. In the current application, the applicant has not proposed monitoring during mining. As part of the monitoring program for impacted and reconstructed streams, biological monitoring should be required, where applicable, to ensure there is no degradation to the communities that inhabit the aquatic resources.

The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

The applicant needs to provide financial assurances for CWA Section 404 mitigation and a long-term management plan. The Guidelines state that "financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments."²² The inherent risk in re-creating streams and wetlands on-site in the post mining landscape, necessitate the security of appropriate financial assurances.

²² 40 CFR 230.93(n)(2)

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An adaptive management plan is provided, however, it does not include approaches or corrective actions to resolve problems that may arise, such as insufficient hydrology for stream restoration, invasive species proliferation or low survival of bare root seedlings.

To comply with the Federal Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs, annual cost estimates for these needs, and the funding mechanism used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

The current application indicates that deed restrictions will be initiated prior to and in conjunction with the Corps approval to cease monitoring; however, specific language under the applicant's long term management discussion indicates there may be portions of the compensatory mitigation where deed restrictions may not be placed. The Guidelines require protection of the entire property in perpetuity.²³ Failure to establish appropriate site protection instruments compromises the long-term sustainability of the resource.

²³ 40 CFR 230.94(c)(4) & 230.97(a)

May. 2. 2016 3:01PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 33

Enclosure 1

March 17, 2016 USEPA and FWS letter

May. 2. 2016 3:01PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 34



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, KY 40201-0059

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and

may impact downstream receiving waters, such as the Ohio River. The effects of multiple large scale surface mining operations and agricultural activities have increasingly taken a toll on the Pigeon Creek watershed. Project area aquatic resources, such as contiguous tracts of increasingly rare bottomland hardwood wetlands, filter out nutrients, and excess sediments and other pollutants to help prevent them from entering nearby tributaries. The loss of these project area aquatic resources would eliminate this function and its contribution to maintaining water quality in downstream waters, such as the Ohio River. Furthermore, the agencies have concerns that, based on the past performance of mitigation efforts in nearby watersheds, proposed efforts to offset impacts to project area aquatic resources may not prove successful.

The affected wetlands and other bottomland forest provide essential habitat for state endangered and federally listed species including Indiana bats (*Myotis sodalis*), northern long-eared bats (*Myotis septentrionalis*), evening bats (*Nycticeius humeralis*), cerulean warblers (*Setophaga cerulean*), northern harriers (*Circus cyaneus*), and copperbelly water snakes (*Nerodia erythrogaster neglecta*). All of these species and several state species of special concern have been documented within the project area. The agencies are concerned about the potential impact of the project on these species.

Indiana has lost eighty-five percent of its wetlands, and large remaining tracts such as those present at the project site are rare. In particular, forested wetlands are a declining resource. According to the National Wetland Reports by FWS, forested wetlands experience the greatest decline of all wetlands types. United Minerals asserts that the additional range of habitat types that would result from reclamation activities at the Seven Hills Mine site will be an improvement over existing conditions. However, given the high acreage of forested wetlands that would be lost, the time it takes for forests to mature, and the poor performance of mitigation on the nearby Somerville and North Millersburg mines, it is highly unlikely that the reclaimed areas will develop habitat that is more productive than what currently exists.

The agencies detailed comments follow.

Independent Utility

The Seven Hills Mine would abut the proposed 3,084.6 acre High Point Mine (LRL-2013-444-rjb), which is also operated by United Minerals. As proposed, the Seven Hills Mine would share the coal slurry pond established as a component of the High Point Mine. Haul roads and other attendant features that would provide access to and serve the Seven Hills Mine, are also described in the High Point application. Based on the information currently available to the agencies, it is unclear whether the Seven Hills Mine would be considered to have independent utility. Therefore, the agencies' request that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. Evaluating the two mines as a single project would allow for a more complete evaluation of practicable alternatives, including efforts to further avoid and minimize environmental impacts. The agencies' previous letters requesting that both proposed mines be evaluated as a single project are enclosed (Enclosures 1 and 2).

Significant Degradation

In accordance with the Clean Water Act Section 404(b)(1) Guidelines (the Guidelines), the agencies believe that this project as proposed may cause or contribute to a significant degradation of Pigeon Creek.¹ The preamble to the Guidelines states that discharges may not be permitted if they will have "significantly" adverse effects on various aquatic resources. In this context, "significant" and "significantly" mean more than "trivial."

Secondary and cumulative impacts are explicitly evaluated during the significant degradation determination. Secondary impacts include effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material.² Cumulative impacts are the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material. Although the impact of a particular discharge may constitute a minor change in itself, the cumulative effect of numerous such piecemeal changes can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems.³

The table below summarizes the cumulative footprints of mining activities in the Highland-Pigeon Creek Watershed and the enclosed map graphically depicts those activities (See Attachment I).

Mining Activity in Indiana Portion of Highland-Pigeon (HUC 8) Watershed	Acres	Square Miles
Actively removing overburden and/or coal extraction	26,856	42
Overburden removal and coal extraction complete	7,308	11
Permit bonded - no overburden removal or coal extracted	4,899	8
Temporary cessation of operations	10	~0
Reclaimed Mines	23,135	36
Total	62,208	97

Within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations in the last 8 years. An additional, 555.86 acres of wetland impacts (including impacts to 463.83 acres of forested wetlands) and 113,187 feet of stream impacts have been identified on the proposed mine sites for the Seven Hills and High Point mines. In total, the permitted and proposed mining activities account for 18,762.6 acres of direct impact, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

¹ 40 CFR 230.1(c)

² 40 CFR 230.11(h)

³ 40 CFR 230.11(g)

The proposed loss of nearly 500 acres of forested wetlands from this project would will increase nutrient loading and sedimentation, causing or contributing to significant degradation of Pigeon Creek and ultimately affecting the quality of freshwater inflow to the Ohio River. Pigeon Creek is listed as impaired for E. coli, dissolved oxygen, impaired biotic communities and nutrients and the Ohio River is listed as impaired for B. coli, dioxin, total mercury and PCBs on Indiana's 303(d) list of impaired waters.⁴ Given the algal issues in the Ohio River in 2015, the agencies are also concerned about possible effects in the Ohio River with respect to safe drinking water, wildlife and recreation (see Attachment 2).

In addition to the localized impacts to water quality, the increase of nutrients and specifically nitrogen in watershed has had a demonstrated effect on water quality. The United States Geologic Survey published a study on the percentage of nitrogen from interior watersheds delivered to the Gulf of Mexico. The Highland-Pigeon Creek watershed was estimated as one of the watersheds to contribute more than 90% of its nitrogen to the Gulf.⁵ BPA's initial SWAT modeling, which does not include cumulative impacts of mining, indicates that the loss of these wetlands along Pigeon Creek would increase nutrient loads to the Ohio River by over 3,500 pounds annually and increase sediment loads by over 260,600 pounds annually.

Project Area Aquatic Resources

The agencies are concerned that the project's CWA Section 404 discharges may result in unacceptable impacts on the Ohio River, Pigeon Creek, and its forested floodplain wetlands. The bottomland hardwood forests within the Pigeon Creek floodplain are an important and productive habitat. In addition to the habitat value of natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.⁶

The Pigeon Creek floodplain is an extremely valuable resource for numerous and significant wildlife species, including migratory birds, non-game wildlife, and threatened and endangered species. Portions of the corridor contain Indiana Department of Natural Resources (IDNR) wetland conservation areas, and other portions are recognized for their unusually high diversity of bird species. The permit area is bordered on the east by an Audubon Society Important Bird Area and on the southeast by the IDNR Bluegrass Fish and Wildlife Area. Bird surveys by Audubon Society members in these two areas and in the Buckskin Bottoms area upstream of the permit area reported over 200 species of birds, including 25 species of waterfowl and 14 species listed as state endangered. Given the proximity and similarity of habitat, it is highly likely that many of those bird species also use this area.

From its headwaters, Pigeon Creek flows approximately 47.5 miles bisecting downtown Evansville before joining with the Ohio River. During the 1800's, Pigeon Creek was part of the

⁴ IDEM, 2014 Indiana Integrated Report Appendix H, 303(d) Attachment 1: TMLD Development Schedules

⁵ Richard B. Alexander, Richard A. Smith, and Gregory E. Schwarz, "Effect of stream channel size on the delivery of nitrogen to the Gulf of Mexico", *Nature*, 17 February 2000, Vol. 403

⁶ <http://water.epa.gov/type/wetlands/bottomland.cfm>

Wabash-Erie Canal and a portion of Pigeon Creek onsite is part of the former canal. Today, the creek provides several recreational paths and fishing access for the public to enjoy. The City of Evansville has developed the Pigeon Creek Greenway Passage. This path is a multiuse trail that follows the creek and then extends along the banks of the Ohio River. The Greenway also incorporates boat launches that the City of Evansville touts as "an important urban watershed and wildlife corridor where you might see an egret or blue heron. With its diversity of plants and animals, the Greenway serves as an outdoor classroom and a valuable learning tool for the environment."⁷ In 2004, the path was designated a National Recreation Trail by the National Park Service.

Wetlands in the Pigeon Creek watershed also help to protect the quality of the Ohio River from nonpoint source pollution from urban runoff, agricultural activities, and both existing and abandoned mines. The Ohio River serves as a source of drinking water, hydroelectric energy, shipping route to the Mississippi River, recreation and fishing. There are presently several fish consumption advisories for the Ohio River.⁸

Endangered and Threatened Species

The proposed project is within the range of the federally endangered Indiana bat (*Myotis sodalis*), and the federally threatened northern long-eared bat (*Myotis septentrionalis*). An Indiana bat maternity colony from a known primary roost tree has been documented using the southern portion of the proposed project area for foraging, and bat survey results indicate the presence of an additional maternity colony which forages on the northern end of the permit area. Although it has not been addressed in the permit application, at least one northern long-eared bat maternity colony has also been documented in the project area; reproductively active females were captured during bat surveys. The proposed mining activity will temporarily or permanently eliminate approximately 690 acres of summer habitat for these species. The proposed restored forest will not become suitable habitat for many years, if ever.

The copperbelly water snake (*Nerodia erythrogaster neglecta*) is known to have reproducing populations along the Pigeon Creek corridor, with known records of individuals in the project area. This species is federally listed as threatened in the northern part of its range, but listing was precluded in southern Indiana due to the development of a Copperbelly Water Snake Conservation Agreement and Strategy, endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective in avoiding impacts to and conserving copperbelly water snake habitat. This permit application is the first action that the FWS is aware of that would not follow the tenants of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

The following species were also documented within the project area:

⁷ <http://www.evansvillegov.org/modules/showdocument.aspx?documentid=12739>

⁸ <http://orsanco.org/river-factsconditions>

State endangered species: northern harrier, least bittern, black-crowned night heron, black tern, Henslow's sparrow, osprey, yellow-headed blackbird, short-eared owl, sedge wren, marsh wren, barn owl, Virginia rail, American bittern, and loggerhead shrike.

Waterfowl: Canada goose, gadwall, mallard, hooded merganser, red-breasted merganser, bufflehead, ruddy duck, wood duck, northern shoveler, lesser scaup, American wigeon, redhead, ring-necked duck, green-winged teal, common goldeneye, northern pintail, snow goose, canvasback, American black duck, tundra swan, greater scaup, cackling goose, white-winged scoter, common merganser, and mute swan.

Scope of NEPA Analysis

The NEPA analysis should include the entirety of the area proposed for mining, including both uplands and aquatic resources. As a result of the proposed Corps' action, there would be direct, indirect, and cumulative human health and environmental impacts beyond the regulated waters, including indirect or cumulative impacts that may be outside of the mine footprint. The NEPA analysis should extend outside of the regulated activity because the "*environmental consequences of the larger project are essentially products of the Corps permit action*".⁹ Further, based on potential impacts to aquatic resources and threatened or endangered species, sufficient Federal involvement exists to expand the scope of the NEPA analysis beyond the regulated activity.¹⁰ Based on the above, the agencies find that the scope of the NEPA analysis should extend outside of the regulated activity, based on potential direct, indirect, and cumulative impacts to resources.

As discussed above under *Independent Utility*, EPA recommends the scope of the NEPA analysis include both the Seven Hills Mine and the adjacent High Point Mine. The analysis should also consider other mines which may be connected-actions¹¹ and/or similar actions.¹² Impacts from nearby mining operations should be analyzed in the same NEPA document.

Preparation of an Environmental Impact Statement

NEPA states that major federal actions which could significantly affect the quality of the human environment require an EIS be prepared. The Council on Environmental Quality (CEQ) has defined "significantly" by two criteria: *context* and *intensity* of impacts of the proposed project.¹³ Seven Hills Mine would cause significant environmental impacts, and, therefore, an EIS should be prepared. We recommend consideration of the following factors regarding significance:

- **Cumulative Impacts:**¹⁴ The proposed mine and the other mining activities would likely lead to impacts to the environment and human health that are cumulatively significant. Mining in this watershed has continued over the last 100 years. A

⁹ 33 CFR Part 325, Appendix B Section 7(b)(2)

¹⁰ 33 CFR 325 Appendix B, Section 7(b)(2)(iv)

¹¹ 40 CFR § 1508.25(a)(1)

¹² 40 CFR § 1508.27

¹³ 40 CFR § 1508.27

¹⁴ 40 CFR § 1508.27(b)(7)

cursor examination of surface coal mining projects within the Highland-Pigeon Creek watershed (8-digit HUC 05410202) in the last 8 years shows that over 352.67 acres of wetlands and 527,689 linear feet of stream impacts have been permitted for direct impact by surface coal mining operations. Additionally, 555.86 acres of wetland and 113,187 feet of stream have been identified on the proposed mine sites, which include Seven Hills and High Point mines. All permitted and proposed mining activities in the last 8 years directly affect 18,762.6 acres, which is 7.9% of the total area of the Highland-Pigeon Creek watershed.

Both particulate matter and hazardous air pollutant levels would be expected to increase as a result of continued mining in the area, exacerbating human health problems related to poor air quality. Nearby communities also experience cumulative and multiple impacts related to the mining and processing of coal, such as noise and vibration. Additionally, the eventual combustion of coal mined at Seven Hills and High Point mines would release high levels of greenhouse gas emissions and contribute to climate change. Therefore, because the impacts from the Seven Hills Mine and other proposed mines could potentially have cumulatively significant impacts on human health and the environment, an EIS should be prepared.

- **Unique characteristics of the geographic area:**¹⁵ The mine site includes areas which the agencies consider to be of significant value: Pigeon Creek and the bottomland hardwoods in the Pigeon Creek watershed. The subwatershed (12-digit HUC Clear Branch Pigeon Creek) is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans. The fact that eighty five percent of the wetland resources once present in Indiana have been lost or altered makes remaining wetlands especially critical resources for conservation.¹⁶ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits, such as maintaining the quality of drinking water and controlling flooding, and in environmental benefits, such as providing habitat for wildlife, including threatened and endangered species. The resources proposed for impact onsite are used by an endangered species, a threatened species, and a species listed as threatened in its northern range. Based on the scale of the proposed project's impacts to important aquatic resources and other ecologically critical areas, an EIS should be prepared.
- **Public Health or Safety:**¹⁷ Living near proposed surface coal mines increases exposure to pollutants and other hazards, raising human health concerns, such as cardiopulmonary diseases and cancers, respiratory disease, kidney disease, hypertension, and issues related to psycho-social stressors.¹⁸ Environmental impacts

¹⁵ 40 CFR § 1508.27(b)(3)

¹⁶ Status and Trends Report on State Wetland Programs in the United States.

¹⁷ 40 CFR § 1508.27(b)(2)

¹⁸ Hendryx, M., and Ahmed, M. *Relations between health indicators and residential proximity to coal mining in West Virginia*. American Journal of Public Health, 2008; 98: 669-671, Walker, E., PhD and Payne, D., MPH *Health Impact Assessment of Coal and Clean Energy Options in Kentucky*. Rep. Kentucky Environmental Foundation, n.d. Web 19 Nov. 2015

from surface coal mining, processing, and burning that contribute to human health include, but are not limited to, water contamination, air emissions, noise, vibration, and flooding. Federally enforceable state regulations prohibit visible emissions from mining activities from crossing property lines,¹⁹ though mine blasting may not be able to meet that requirement. Demographic data indicate a high percentage of children living in the area are under the age of five. Children are particularly vulnerable to impacts from exposures to air pollutants. Environmental data show high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. We are concerned about cumulative impacts to the surrounding communities given that Seven Hills Mine would be located near other operating and proposed mines, further exacerbating existing exposures. Based on the potentially significant impacts to public health and safety, an EIS should be prepared.

- **Threatened and Endangered Species:**²⁰ As discussed above, the proposed Seven Hills Mine is within the range of the endangered Indiana bat (*Myotis sodalis*) and the threatened Northern long-eared bat (*Myotis septentrionalis*) and these species have been documented using the site. Additionally, the Copperbelly watersnake (*Nerodia erythrogaster neglecta*) is known to have breeding populations along Pigeon Creek. Because there are potentially significant impacts to threatened or endangered species, an EIS should be prepared.

The agencies note that preparation of an EIS for a surface coal mine would not set a new precedent for the analysis of impacts to human health and the environment. EISs have been prepared for coal mines with similar scopes of impacts, such as:

- Fort Worth Corps District is currently considering a Regional Draft EIS for Surface Coal and Lignite Mining in Texas (Draft EIS CEQ #20150191);
- Fort Worth Corps District prepared an EIS for the Rusk Mine in Texas (Final EIS CEQ #20110148);
- Fort Worth Corps District prepared an EIS for the Three Oaks Mine in Texas (Final EIS CEQ #20030199); and
- Louisville Corps District previously issued an EIS for the Delta Coal Mine Complex in Illinois (Final EIS CEQ #19960416).

The NEPA process allows the Corps to fully consider potential impacts and measures to avoid, minimize, and mitigate those impacts as a means to achieve more informed decision-making and better project outcomes. The scope of analysis for the NEPA document on the proposed Seven Hills Mine should cover the entire mine site, including both uplands and aquatic resources, and the entirety of High Point Mine. Due to potentially significant cumulative impacts, adverse impacts to threatened and endangered species, impacts to unique characteristics of the geographic area, and risks to public health and safety, the agencies believe the Corps should prepare an EIS.

¹⁹ 326 Indiana Administrative Code 6-4-2

²⁰ 40 CFR§ 1502.27(b)(9)

Mitigation and Monitoring

The applicant proposes to mitigate for 510.16 acres of wetland (462.18 acres palustrine forested, 19.81 acres palustrine emergent, 13.43 acres of palustrine emergent, and 1.04 acres of palustrine-unconsolidated bottomland) and 53,840 linear feet of ephemeral, intermittent and perennial stream, using a combination of on-site stream mitigation, and on-site and off-site wetland mitigation, in and out-of-type. Approximately 49,627 linear feet of stream is proposed to be constructed on-site in the approximate original contour.

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.²¹ An in-depth discussion regarding mitigation is premature without first considering additional avoidance and minimization efforts to help ensure that proposed discharges represent the least environmentally damaging practicable alternative. However, the agencies have reviewed the proposed on-site and off-site compensatory mitigation plans and offer the following general comments at this time to help improve the mitigation plan.

The mitigation plan does not consider and compensate for the secondary, cumulative, and temporal effects of this project on the immediate and greater watershed. With two active and proposed abutting mines in the same watershed, it is imperative to take connectivity into account when designing mitigation.

The mitigation ratio proposed for forested wetland is 2:1. In support of this ratio, the applicant states that off-site mitigation will begin once the permit is issued, thereby offsetting both temporal and cumulative loss. This proposed mitigation ratio is not sufficient given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. Forested wetlands experience the greatest decline of all wetland types and are extremely difficult to restore or create.

EPA and FWS recommend that the applicant be required to mitigate for bottomland hardwood forest at a ratio of 4:1. This ratio is appropriate given that the Federal Mitigation Rule states that the district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site.²² For mitigation to be considered successful, performance standards in the mitigation plan would have to be achieved. It is our understanding that the hydrology will not be re-established until the end of mine excavation for those areas of the project where mitigation is proposed within the mine footprint (rather than the mitigation proposed at the "avoided" areas).

Previous mitigation projects on mine sites have shown that the establishment, restoration, and enhancement of aquatic resources involves risk, and success in generating functional lift is often

²¹ 40 CFR 230.91(c)

²² 40 CFR 230.93(f)(2)

elusive. The FWS asserts that wetlands of this magnitude, and in this landscape location, cannot be adequately restored based on the failure of previous efforts to restore bottomland forest associated with the North Millersburg Mine. The finished topography on much of the reclaimed area was too high in elevation to function as bottomland forest. Whereas the original intention of the reclamation plan was to reproduce floodplain elevations with forest surrounding the impoundments, in some areas the land adjacent to the impoundments looks more like rolling hills than floodplain. The area now consists chiefly of a mixture of upland fields, upland non-forested areas and large, shallow permanent impoundments. The Final Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally done by applying appropriate ratios so that the amount of compensation will be adequate to offset the authorized impacts even if the mitigation is not 100% successful.

The plan proposes to restore 510.6 acres of palustrine forested wetlands within the proposed mine boundary and discusses how restoration in areas east of Pigeon Creek will allow for streams and wetlands to interact hydrologically during periods of overbank flooding. However, it is unclear how this interaction will be affected given the existing levee that runs along the east edge of Pigeon Creek, directly west of a portion of the proposed on-site mitigation. The floodway modification plan for this area is not supported by hydrologic monitoring or modeling. The application indicates a runoff retention ratio of 5:1 for the proposed area; however, runoff retention ratios of 20:1 are considered optimal for forested wetland based on the referenced study. Additional clarification on the determination of 2,500 acres as the contributing cumulative watershed is needed. The mitigation plan does not detail how the proposed stream and wetland mitigation will tie in with aquatic resources adjacent to the site boundary.

Assessment of existing uses should also consider the increased streambed infiltration that results from attempting to restore streams in mined areas. It is likely that the intermittent and ephemeral streams would not have adequate flow, which will impact existing uses in the compensatory mitigation streams. Considering the extensive impacts to the Highland-Pigeon Creek watershed as identified in the IDEM Highland-Pigeon Creek watershed management plan, stream corridor restoration efforts for the channelized sections of Pigeon Creek within, as well as up and downstream of the project boundary, are warranted.

In addition to the on-site reclamation, the applicant proposes off-site mitigation on 575.9 acres on Greathouse Island, an abandoned oxbow of the Wabash River, in Posey County, Indiana. Proposed mitigation measures include reforestation on 316.9 acres of open land and enhancement of 258.9 acres of existing forested wetland. The off-site wetland mitigation proposal is not acceptable. This proposed site is outside of the watershed of impact, and while it may provide some benefits to the Ohio River, to which the Wabash River is a tributary, it will not provide functional benefits to the Highland-Pigeon Creek watershed which has been extensively altered by mining. Permittee-responsible mitigation (PRM) projects are designed to offset specific impacts, and are therefore more likely to reduce the severity of project site impacts. The off-site PRM proposed on Greathouse Island appears to be intended to offset functional losses, however, they would not occur within the project footprint and would not result in functional gains within the watershed. According to the application, the enhancement areas will be selectively harvested to reduce the existing canopy cover by 50 percent. It is

unclear how harvesting trees from an existing forested wetland will provide mitigation for forested wetland impacts. The instability of the proposed site is also of concern. This site is a remnant meander of the Wabash River that is part of a dynamic system within a floodplain. Upstream hydrologic processes and perturbations will control hydrology in this area, including reactivating former channels and influencing channel shifting in the long-term. This complicates the long term management of the site and maintenance of functions in perpetuity.

The applicant claims that the off-site mitigation will provide additional habitat for the federally endangered Indiana bat, as well as several other bat species. While the mitigation, if successful, will provide habitat for the Indiana and northern long-eared bat, it will take several years before it is suitable foraging habitat and many more years before it becomes suitable roosting habitat, if ever. Also, the off-site mitigation will not provide any benefit to the known maternity colonies in the proposed project area, as both Indiana and northern long-eared bats display high site fidelity, returning to the same roosting habitat year after year.

While the objectives of the mitigation area are to provide flood, sediment, and nutrient storage for the Wabash River, there is no indication of the degree or level of functional lift provided compared to existing conditions, how that lift would benefit the watershed of impact or the likelihood of success given the activities proposed. Because it will take some years before the off-site mitigation is established, and it is nearly 40 miles and two watersheds away from the impact area, it is unlikely to offset either the temporal or cumulative loss of wetlands. EPA and FWS recommend the applicant explore mitigation opportunities within the impacted watersheds specified in the IDEM June 2003 Highland-Pigeon Creek Watershed Management Plan.

Monitoring and Long Term Management

The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas. The Guidelines state that "financial assurances may be in the form of performance bonds, escrow accounts, casualty insurances, letters of credit, legislative appropriations for government sponsored projects, or other appropriate instruments".²³ The increase in coal companies filing for Chapter 11 Bankruptcy²⁴ and the inherent risk in re-creating streams and wetlands on-site in the post mining landscape necessitate the establishment of appropriate financial assurances.

To comply with the Mitigation Rule, the applicant must provide detailed long-term management plans. A long-term management plan should include a description of the long-term management needs and annual cost estimates for these needs, and should identify the funding mechanism that will be used to meet those needs. Appropriate long-term financing mechanisms include endowments, trusts, contractual arrangements with future responsible parties, and other appropriate financial instruments.

²³ 40 C.F.R. §230.93(n)(2)

²⁴ <http://www.businessfinancenews.com/24344-is-arch-coal-inc-on-the-verge-of-chapter-11-bankruptcy/>

May. 2. 2016 3:04PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 45

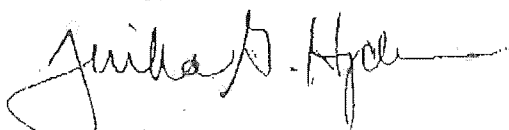
An adaptive management plan is provided, however, it does not include a root cause analysis or describe necessary corrective actions if insufficient hydrology makes stream restoration infeasible.

As part of the monitoring program for affected and reconstructed streams, physical, chemical and biological monitoring should be required. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

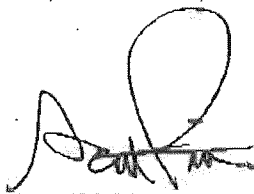
The applicant currently proposes to monitor for 10 years or until success criteria are met. EPA agrees with this monitoring schedule as long as appropriate performance standards are established and met post mining. However, it should be noted that the expected tree growth may not advance during the 10 year monitoring period to the point where it will qualify as a palustrine forested wetland.

Thank you for your consideration of our comments and recommendations to aid in the evaluation of project impacts to environmental resources within the Pigeon Creek Watershed, consistent with the requirements of the NEPA, CWA and ESA. We look forward to discussing these comments with you. Prior to the closing of the public comment period additional CWA Section 404 comments will be forthcoming. Please contact Wendy Melgin from the U.S. Environmental Protection Agency at melgin.wendy@epa.gov or (312) 886-07745 and Marissa Reed from U.S. Fish and Wildlife Service at marissa_reed@fws.gov or (812)334-4261 with any questions.

Sincerely,



Tinka Hyde
Director, Water Division
U.S. Environmental Protection Agency



Scott Pruitt
Field Supervisor
U.S. Fish and Wildlife Service

Enclosures
Attachments

cc: Martha Clark-Mettler, IDEM
David Carr, IDEM
LeAnne Devine, USACE-Louisville District
George DeLancey, USACE-Louisville District
Bob Krska, USFWS-Regional Office, Bloomington, MN
Jason Miller, USFWS-Headquarters, Falls Church, VA

May. 2. 2016 3:04PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 46

Enclosure 1

May. 2. 2016 3:05PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 47



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

NOV - 6 2013

REPLY TO THE ATTENTION OF:
 WW-16J

U.S. Army Corps of Engineers, Louisville District
 ATTN: Mr. George DeLancey, CELRL-OP-FW
 P.O. Box 489
 Newburgh, Indiana 47629-0489

Re: United Minerals Company, LLC-Seven Hills Mine, LRL-2013-635-GJD

Dear Mr. DeLancey:

The U. S. Environmental Protection Agency has reviewed the preliminary Clean Water Act (CWA) Section 404 permit application (permit application) for the subject project. Under United Minerals Company, LLC's preliminary proposal, approximately 458.2 acres of wetlands (of which 401.5 acres are forested) and 31,762 linear feet of streams, would be impacted for the construction of the 2,351.2-acre Seven Hills Mine in the Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 1,370.3 acres of the site has been previously mined. Two distinct previously mined areas lie in the eastern and southern portions of the permit area. We offer the following comments based on our review of the preliminary permit application.

Land Use/Existing Conditions

A November 2010 letter from the United States Fish and Wildlife Service (USFWS) to the Indiana Department of Natural Resources (IN DNR) commenting on the Surface Mining Control and Reclamation Act (SMCRA) permit application for the Seven Hills Mine, conveyed serious concerns about proposed impacts to wetlands and other bottomland forest along Pigeon Creek that provide abundant habitat for numerous and significant wildlife species, including migratory birds, the Copperbelly water snake (*Nerodia erythrogaster neglecta*), and the federally endangered Indiana bat (*Myotis sodalis*). In addition to the habitat value of these natural areas, bottomland hardwoods serve a critical role in the watershed by reducing the risk and severity of flooding to downstream communities by providing areas to store floodwater. These wetlands improve water quality by filtering and flushing nutrients, processing organic material, and reducing sediment before it reaches open water.¹ Forested wetlands are ecologically important systems and represent some of the most diverse, complex, and productive freshwater wetlands in the Nation. In spite of their high value, these systems have experienced significant decline in

¹ <http://water.epa.gov/type/wetlands/bottomland.cfm>

area throughout the United States. Between 2004 and 2009, forested wetlands declined by an estimated 633,100 acres. This trend in forested wetlands loss only heightens the significance of any additional loss of these resources.²

United Minerals Company, LLC (UMC) asserts that the additional range of habitat types that would result from reclamation at the Seven Hills Mine site will be an improvement over existing conditions; however, this assertion is not supportable given the high acreage of forested wetlands that would be lost.

Alternatives Analysis

The preliminary application information does not provide an adequate range of alternatives that avoid and minimize impacts to aquatic resources at the project site to the maximum extent practicable under the CWA Section 404(b)(1) Guidelines (Guidelines). The amount of effort and level of detail included in the analysis must be commensurate with the level of aquatic resources impacted, which EPA believes to be significant in this case. EPA strongly recommends the applicant provide alternatives that include considerable avoidance of valuable bottomland wetland habitat. For example, UMC should consider alternatives that include mining from the eastern portion of the site (which includes previously mined areas) towards the west, up to the bottomland wetland areas (leaving a sufficient buffer), and augering under the wetlands. UMC makes a general statement in the permit application that "historically augering activities have proven to not be cost effective in most circumstances."

EPA understands that more coal can be extracted using the open pit method than the augering method; however, no information is provided to demonstrate that augering is cost prohibitive specific to this project. The practicability of each alternative should be considered in light of cost, logistics, and available technology and evaluated at a level that reflects the significance of the resources to be impacted.

Cumulative Impacts

In order to fully analyze the past, present, and reasonable foreseeable impacts as required under the National Environmental Policy Act (NEPA) and the Guidelines, the applicant should prepare a cumulative impacts analysis that details changes in hydrology, drainage patterns, and channel composition in the watershed. Impact assessments for wetlands should include direct and indirect impacts from previous and current actions as well as impacts from future actions as a result of changes in surface and groundwater hydrology.

The cumulative impacts analysis should also discuss potential ecological impacts associated with the loss of forest cover and forest fragmentation along the Pigeon Creek bottomlands. As mentioned above, USFWS expressed this as a serious concern in its November 2010 letter to IN DNR. The mining activity would temporarily or permanently eliminate at least 600 acres of summer habitat for the endangered Indiana bat (*Myotis sodalis*) and valuable habitat for other

² United States Fish and Wildlife Service. 2011. *Status and Trends of Wetlands in the Conterminous United States 2004 to 2009*.

species such as the Copperbelly water snake (*Nerodia erythrogaster neglecta*). EPA understands that listing of this species in southern Indiana was precluded due to development of a *Copperbelly Water Snake Conservation Agreement and Strategy* (Agreement) endorsed by the USFWS, IN DNR, and the Indiana Coal Council, which is now expired. According to the USFWS, since the expiration of the Agreement, all parties have continued to implement the goals of the Agreement voluntarily, to avoid and conserve Copperbelly water snake habitat. This permit application is the first USFWS is aware of that would not follow the tenants of the Agreement.

A Clean Water Act Section 404 permit was issued for the nearby Liberty Mine, LRL-2010-218-gjd, in April 2012. The permit authorized impacts to 8,948 feet of perennial streams, 5,183 linear feet of intermittent streams, 6,212 linear feet of ephemeral streams, 35.3 acres of forested wetlands, 63.3 acres of emergent wetlands, and 0.8 acre of scrub-shrub wetlands. In addition, the recently proposed High Point Mine (LRL-2013-444-rjb) is approximately 3084.6 acres in size and abuts the proposed site. According to Robert Brown of your office, the proposed High Point Mine would impact approximately 27 acres of wetlands and 63,000 linear feet of streams. This mine would also be operated by UMC. EPA requests that the Corps treat the proposed High Point Mine and proposed Seven Hills Mine as a single project. They are abutting UMC mines, appear to be at similar stages of development in the permitting process, and the preparation plant serving both operations would be constructed on the High Point Mine site.

Environmental Justice Concerns

Based on the limited information provided in the permit application and other environmental and demographic data, EPA believes the proposed mine may raise environmental justice concerns. Demographic data indicate there are both high percentages of low-income individuals and children under the age of five, who are particularly vulnerable to impacts from mining operations. Environmental data shows high levels of particulate matter (PM_{2.5}) and a high number of major water dischargers in the area. EPA is concerned that communities would potentially be disproportionately impacted by the proposed mine. Further, EPA is concerned about cumulative impacts to the surrounding communities, given that the proposed mine would be located near an operating mine, further exacerbating existing exposures to sensitive populations.

Preparation of an Environmental Impact Statement

Section 102(2)(C) of NEPA identifies major federal actions that "significantly" affect the quality of the human environment requiring an environmental impact statement (EIS). In regulations the Council on Environmental Quality promulgated under NEPA, "significantly" is defined by two criteria: context and intensity of impacts of the proposed project.³ 'Context' refers to the affected environment in which a proposed action would occur and 'intensity' means the degree to which the proposed action would include one or more of the factors listed below, among others. The Seven Hills Mine, as currently proposed, appears to exceed thresholds for significance based on the context and intensity of the project. Therefore, EPA strongly recommends that the Corps prepare an EIS for this project for the following reasons:

³ 40 CFR § 1508.27

- **Unique characteristics of the geographic area:** The Seven Hills Mine would impact approximately 458.2 acres of wetlands and 31,562 linear feet of streams. The impacted subwatershed is a candidate for protection per Indiana Department of Environmental Management (IDEM) watershed management plans.⁴ According to the Indiana Wetlands Conservation Plan, wetlands serve important functions, both in human benefits such as maintaining the quality of the water we drink and controlling flooding, and in environmental benefits, such as providing habitat for endangered species of wildlife and plants. The fact that the majority of the wetland resources once present in Indiana have been lost or altered makes wetlands especially critical resources for conservation.⁵ Because of the scale of the proposed project's impacts to ecologically critical areas, EPA views the preparation of an EIS as appropriate.⁶
- **Public Health or Safety:** As discussed above, the proposed mine may raise environmental justice concerns. Adjacent communities include a high number of low-income individuals and a high number of children under the age of five. These populations are more sensitive to impacts and potentially experience unique exposure pathways. Communities may be exposed to multiple mine-related impacts, including fugitive dust, noise, and water discharge. Based on this, the potential for public health and safety risks are increased and an EIS should be prepared.⁷
- **Cumulative Impacts:** As mentioned in the comments on Cumulative Activity, Seven Hills Mine would be located near an active mine and abutting a proposed mine. Additional mining activities would likely lead to impacts that are cumulatively significant.⁸ The cumulative impacts from the Seven Hills Mine and other proposed mines could potentially have significant impacts on human health and the environment, and would be grounds for the preparation of an EIS.
- **Threatened and Endangered Species:** As discussed above, the proposed Seven Hills Mine is within the range of Indiana bat (*Myotis sodalis*) maternity roosting habitat (endangered) and the Copperbelly watersnake, which has been previously proposed for inclusion on the federal threatened species list for this area. Potential impacts to threatened or endangered species are considered grounds for the preparation of an EIS.⁹

As discussed above, EPA believes the proposed project should be analyzed in conjunction with other similarly proposed projects in the area, including the High Point Mine. The operation of both mines relies on shared infrastructure, including the preparation plant, which is located within the proposed footprint of High Point Mine. This qualifies the permitting of both mines as connected actions,¹⁰ which should be analyzed in one NEPA document.

⁴ <http://ai.org/idem/mps/3241.htm>

⁵ Indiana Department of Natural Resources, 1996, *Indiana Wetlands Conservation Plan*.

⁶ 40 CFR § 1508.27(b)(3)

⁷ 40 CFR § 1508.27(b)(2)

⁸ 40 CFR § 1508.27(b)(7)

⁹ 40 CFR § 1508.27(b)(9)

¹⁰ 40 CFR 1508.25(a)(1)

Mitigation and Monitoring

Compensatory mitigation is the last step in the sequence during a CWA Section 404 permit review.¹¹ An in-depth discussion regarding mitigation is premature given the applicant first needs to adequately address avoidance and minimization. However, per the Corps' request, EPA has reviewed the proposed on-site and off-site compensatory mitigation plans and offers the following general comments at this time to help improve the mitigation plan.

- The applicant needs to document how avoided stream reaches will be preserved or affected during mining and what that will mean for reconstructed stream reaches in terms of flow regime.
- The applicant needs to explain the rationale behind selecting the proposed performance goals of EPA Rapid Bioassessment Protocol (RBP) scores of at least 115 for intermittent stream mitigation reaches and at least 110 for ephemeral stream mitigation reaches. EPA recommends that the applicant locate reference reaches in the area to use as a guide to develop stream mitigation goals. As you know, reference conditions in the region can be used to scale the assessment to the "best attainable" condition for mitigation reaches.
- The mitigation ratio proposed for forested wetland is 2:1. The proposed mitigation ratio is too low given the valuable functions of the resources proposed to be impacted, the temporal loss of function between the time the wetlands are impacted and the maturation of the mitigation site, and the risk associated with establishing forested wetlands. EPA recommends that the applicant be expected to mitigate for bottomland hardwood forest at a ratio of 4:1.
- The off-site wetland mitigation proposal is in need of significant improvement. More detail on the existing conditions of the mitigation areas, especially those proposed for preservation and enhancement, is necessary to determine the merit of the proposal.
- The applicant needs to address financial assurances in a CWA Section 404 context and provide a long-term management strategy/plan for mitigation areas.
- As part of the monitoring program for affected and reconstructed streams, biological monitoring should be required to ensure there is no degradation to the communities that inhabit the streams. Biological monitoring, along with water chemistry and physical assessments, should occur: 1) prior to the initiation of mining activities to establish baseline conditions; 2) during the mining activities to assist in determining potential impacts to aquatic habitat and water quality downstream of the impacts; and 3) for at least five years after the completion of stream restoration and site reclamation activities at the mine site where appropriate to determine mitigation success. The applicant has not proposed sampling during mining.

In conclusion, we strongly recommend that the Corps consider our recommendation to prepare an EIS for this project and our comments above to protect the significant resources within the Pigeon Creek bottomlands. Thank you for the opportunity to review the preliminary application for the Seven Hills Mine. We look forward to discussing these comments with you. Please

¹¹ 40 CFR 230.91(c)

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 52

contact Melissa Blankenship of our office at (312) 886-6833 or (503) 326-5020 with any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Peter Swenson". The signature is fluid and cursive, with the first name "Peter" and last name "Swenson" clearly distinguishable.

Peter Swenson, Chief
Watersheds and Wetlands Branch

cc: David Carr, IDEM
Scott Pruitt, USFWS-Bloomington
James Townsend, USACE-Louisville District

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

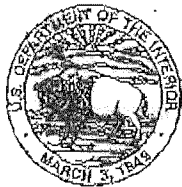
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Enclosure 2

May. 2. 2016 3:06PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 54

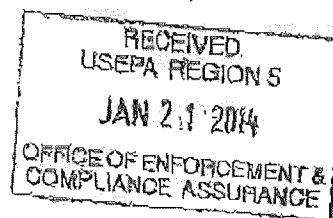
Elizabeth F. Fide

United States Department of the Interior Fish and Wildlife Service



Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

January 10, 2014



Mr. George DeLancey
U.S. Army Corps of Engineers
CELRL-OP-FW
P.O. Box 489
Newburgh, IN 47629-0489

Dear Mr. DeLancey:

This responds to your letter of August 13, 2010 requesting U.S. Fish and Wildlife Service (FWS) comments on a permit application (LRL-2013-635) for the United Minerals Company, LLC proposed Seven Hills Mine (S-00357) in Warrick County, Indiana.

These comments are consistent with the Fish and Wildlife Coordination Act (16 U.S.C. 661 et. seq.), the National Environmental Policy Act of 1969, the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service's Mitigation Policy, and the Indiana Coal Mining Regulatory Program, Section 310 IAC 12-3-107.

The proposed permit area covers 2351 acres. The proposed water resource impacts include over 31,762 feet of stream channel (2,589 feet ephemeral, 28,973 feet intermittent, and 200 feet perennial), approximately 458 acres of wetlands (401.5 forested, 4.45 emergent, and 52.15 shrub), and 29 acres of open water.

The permit area contains a combination of undisturbed bottomland along Pigeon Creek, including approximately 7,876 feet of the Pigeon Creek channel, and previously mined land in the North Millersburg, South Millersburg and Ayrshire mines. Most of the previously mined land has been reclaimed to a mixture of forest, wildlife land and agricultural land.

Wildlife Habitat

The affected wetlands and other bottomland forest provide abundant habitat for numerous and significant wildlife species, including migratory birds, Indiana bats (*Myotis sodalis*), Northern long-eared bats (*M. septentrionalis*), and the copperbelly water snake (*Nerodia erythrogaster neglecta*). We do not have a comprehensive bird species list for the permit area, however bird surveys by Audubon Society members in the Buckskin Bottoms area north (upstream) of the

Page 2 of 4

permit area reported over 180 species of birds including 9 species listed at that time as State-endangered species.

An Indiana bat maternity colony from a known primary maternity roost tree has been documented using the southern portion of the proposed permit area for foraging, and bat survey results suggest the presence of an additional maternity colony which forages on the northern end of the permit area. The proposed mining activity would temporarily or permanently eliminate approximately 690 acres of summer habitat for this species and restored forest will not become suitable habitat for many years.

At least one Northern long-eared bat maternity colony has also been documented using the permit area with the capture of reproductively active females during bat surveys. Northern long-eared bats generally require similar summer habitat to that of Indiana bats, therefore the proposed mining activity would impact approximately 690 acres of habitat for this species.

The copperbelly water snake is known to have reproducing populations along the Pigeon Creek corridor. Listing in southern Indiana was precluded due to development of a Copperbelly Water Snake Conservation Agreement and Strategy endorsed by the FWS, the Indiana DNR, and the Indiana Coal Council (Agreement). Even though it has expired, the Agreement has proven effective at avoiding and conserving copperbelly water snake habitat. This permit application is the first action we are aware of that would not follow the tenets of the Agreement. This type of mining activity in prime habitat could cause the FWS to re-evaluate listing of the southern population of the copperbelly water snake.

Mitigation

A thorough review of the proposed mitigation has not been conducted; however, the FWS asserts that wetlands of this magnitude and in this landscape location cannot be adequately restored based on the failure of previous efforts associated with the North Millersburg Mine. The North Millersburg mined land on the east side of the Pigeon Creek floodplain was to have been restored to its pre-mining condition of bottomland forest, however the actual restoration consisted chiefly of a mixture of upland fields, upland non-forested wildlife habitat and large, shallow permanent impoundments.

Cumulative Impacts

The proposed Seven Hills Mine, in combination with the two previous Millersburg Mines, would permanently or temporarily eliminate the vast majority of approximately 4000 acres of habitat along the Pigeon Creek corridor. As previously stated in this letter, the bottomland forest in the North Millersburg permit area was permanently lost. In addition, the newly proposed High Point Mine would impact approximately 2,500 acres of wildlife and forest habitat, including 27 acres of wetlands and 63,000 linear feet of streams.

A November 2013 letter from the U.S. Environmental Protection Agency (EPA) to the U.S. Army Corps of Engineers (Corps) requests that the Corps treat the High Point Mine and the Seven Hills Mine as a single project. The FWS supports this request since the mines have overlapping permit boundaries and will share a coal processing plant.

Endangered Species

The proposed project is within the range of the Federally endangered Indiana bat (*Myotis sodalis*), sheepsnose mussel (*Plethobasus cyphus*) and the northern long-eared bat (*M. septentrionalis*), a species proposed as endangered under the Endangered Species Act. The sheepsnose mussel is restricted to the Ohio River and will not be impacted by the proposed mining operation.

As stated previously, there is known summer habitat for Indiana and northern long-eared bats present throughout the permit area, and the proposed mining operation will eliminate a significant amount of habitat for these species. In accordance with our national biological opinion issued to the Office of Surface Mining, United Minerals Company developed an Indiana Bat Protection and Enhancement Plan (PEP) outlining measures to minimize take of Indiana bats. To date, the northern long-eared bat has not been addressed.

The northern long-eared bat was proposed for federal listing under the ESA on October 2, 2013. Species proposed for listing are not afforded protection under the ESA; however as soon as a listing becomes effective, the prohibition against take applies. The final listing decision for the northern long-eared bat is expected in October 2014. This could cause project delays, since potential adverse effects to the northern long-eared bat have not been previously addressed. Therefore, the FWS strongly encourages applicants to address the northern long-eared bat while it is proposed for listing. Interim guidance on addressing impacts to northern long-eared bats can be found online at

<http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>

In conclusion, the FWS continues to oppose a mining plan that will substantially alter the Pigeon Creek bottoms and result in hundreds of acres of wetland impacts. We recommend that the mining operation be altered to avoid mining disturbance in existing forest and wetland habitat in the Pigeon Creek floodplain.

Due to the extensive wildlife habitat proposed under this mining plan, and the extent of cumulative impacts of mining in the Pigeon Creek bottomland corridor, we believe that development of an Environmental Impact Statement is appropriate.

The FWS considers the Pigeon Creek floodplain to constitute a productive and valuable public resource which serves significant natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting habitat for aquatic and land species. As defined by the Section 404(b)(1) Guidelines, we consider the site to be a Special Aquatic Site that possesses special ecological characteristics of productivity, habitat, wildlife protection and

May. 2. 2016 3:07PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 57

Page 4 of 4

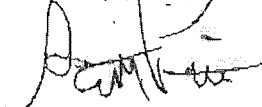
other important and easily disrupted ecological values. Therefore, the U.S. Fish and Wildlife Service requests that this permit be denied.

Pursuant to Part IV, Paragraph 3(a) of the Memorandum of Agreement Between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act dated December 21, 1992, it is the opinion of the Department of the Interior that the project may result in substantial and unacceptable impacts to aquatic resources of national importance.

We are providing this letter to reserve the option to elevate this individual permit action if significant differences remain between our agencies over the disposition of this permit, in accordance with the Memorandum of Agreement (MOA) between the Department of the Interior and the Department of the Army on Section 404(q) of the Clean Water Act, dated December 21, 1992. Pursuant to Part IV, Paragraph 3(b) of the MOA, it is the opinion of the Department of the Interior that the project will result in substantial and unacceptable impacts to aquatic resources of national importance.

For further discussion, please contact Marissa Reed at (812) 334-4261 ext. 1215 or marissa_reed@fws.gov.

Sincerely yours,



Scott E. Pruitt
Field Supervisor

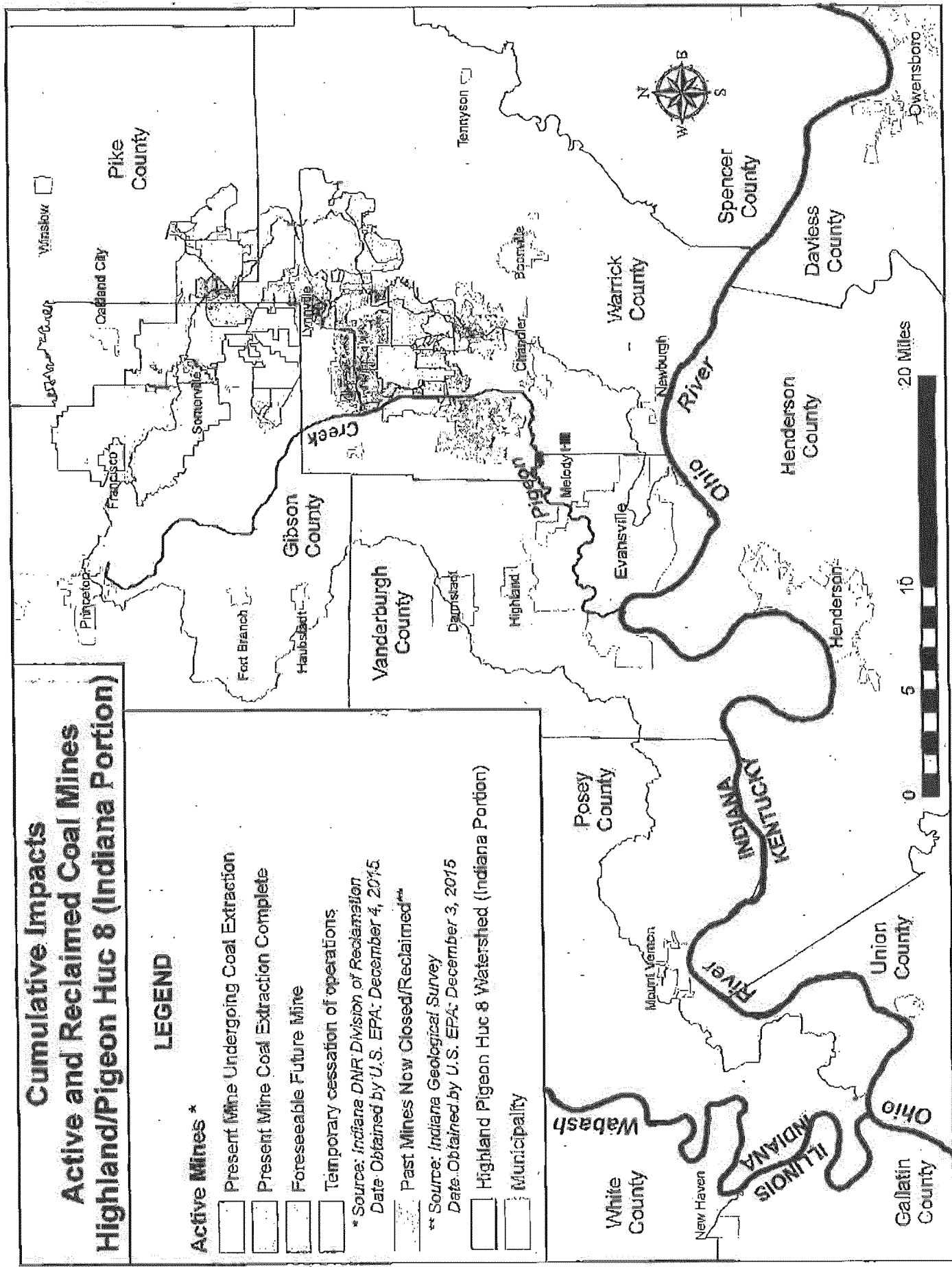
cc: Ramona Briggeman, IDNR Division of Reclamation, Jasonville, IN
Eric Langer, IDNR Division of Reclamation, Jasonville, IN
Melissa Blankenship, US EPA, Chicago, IL

May. 2. 2016 3:07PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 58

Attachment 1



May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 60

Attachment 2

October 2015 Microcystin Concentrations and Proximity to Drinking Water Intakes

LEGEND

- Microcystin Concentrations Exceeds EPA and IDEM Thresholds for Drinking Water and Recreation
- Microcystin Concentrations Below EPA and IDEM Thresholds for Drinking Water and Recreation

N Non Detects

⊗ Public Water Supply Intakes

▭ Highland Pigeon Huc 8 Watershed (IN Portion)

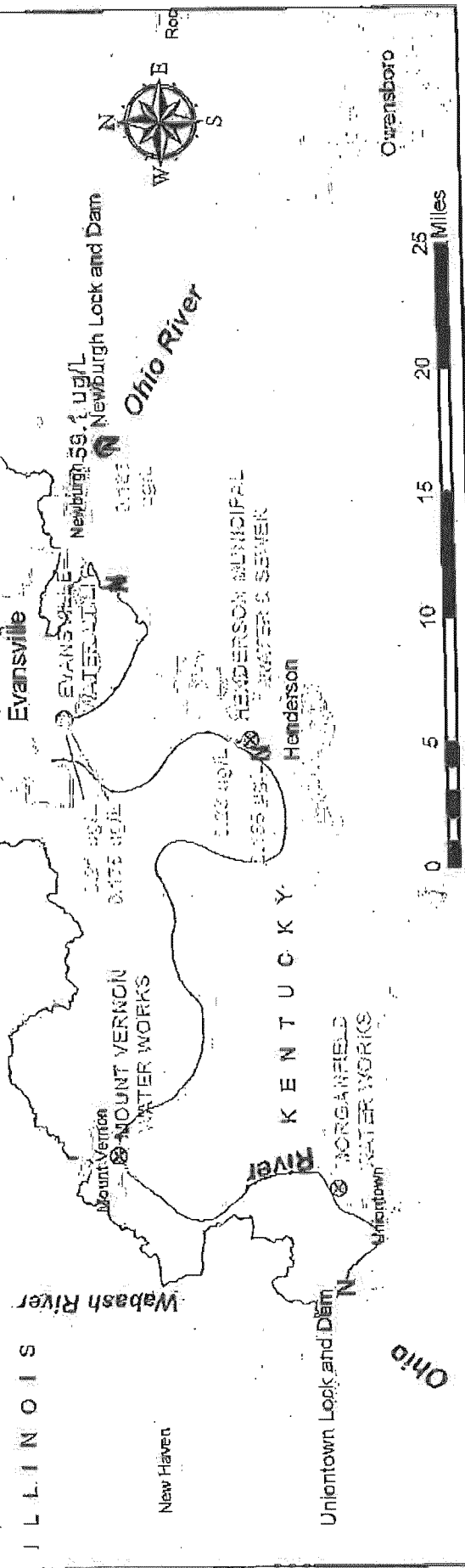
Mainstem Pigeon Creek Floodplain Wetlands *

■ Forested Wetlands (4461 Acres)

■ Other Wetland Types (1709 Acres)

■ Open Water (255 Acres)

* Source of Wetland Data: National Wetland Inventory, USFWS



May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 62

Enclosure 2
Millersburg II Mine Documents

May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 63

AUG 06 1997

WW-16J

Colonel Ralph Grieco
District Engineer
U.S. Army Corps of Engineers
Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Attention: Mr. Ron Sadri, Reference No. 199501367-rjs

Dear Colonel Grieco:

This is in response to your Pre-Construction Notice for activities proposed by Peabody Coal Company at their Millersburg II North operations near Pigeon Creek in Warrick County, Indiana. Peabody is requesting authorization under Nationwide Permit No. 21 for discharges into approximately 50 acres of Palustrine Forested (PFO) wetlands associated with their proposed surface coal mining activity.

We have reviewed the materials you provided and we believe that the proposal, as presently stated, does not meet the requirements for the Nationwide permit because (1) the applicant has not avoided or minimized adverse impacts to the maximum extent practicable, and (2) the applicant's proposed mitigation does not fully address the loss of functions and values that will occur as a result of the mining activity.

The Pigeon Creek corridor is a locally important aquatic resource that cannot easily be replaced. Therefore, impacts to the corridor should be avoided to the extent possible, and unavoidable impacts should be mitigated within the corridor. A major impact to the corridor is a levee shown in the materials you provided. It appears that adverse impacts to the corridor could be significantly reduced by relocating the levee to the toe of the slope. Unless the applicant can demonstrate that this action is totally impracticable, we recommend that you require the applicant to relocate the levee.

The applicant's proposed mitigation is insufficient to replace the functions and values of PFO wetland, especially in view of the location of the proposed off-site mitigation, time needed for restoration of PFO functions and values, and the uncertainty of success.

May. 2. 2016 3:08PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 64

2

Because of the value of the Pigeon Creek corridor, we recommend that the applicant make every effort to locate the mitigation area within the corridor. Given the size of the project area, it appears that the applicant could restore additional PFO wetlands within the corridor.

Since the time frame for PFO restoration is very long and because PFO restoration has had a high rate of failure, we recommend that you require a mitigation ratio of at least 2:1, which would require the applicant to produce 100 acres of PFO wetland. We recommend that at least 50 acres of this mitigation be within the Pigeon Creek corridor.

Because of inherent problems in successfully creating 100 acres of PFO wetlands, monitoring during the earthmoving and grading phases is critical. The proposed mitigation plan does not contain enough information to indicate that sufficient monitoring and corrective actions will take place at this time. Therefore, the mitigation plan should require additional monitoring by staff or other representatives of your office who are experienced in PFO restoration, and the permit should clearly state that the applicant will be required to take any corrective actions that you determine necessary as a result of the monitoring.

In summary, it appears that without further avoiding, minimizing, and mitigating adverse impacts, this project does not meet the requirements for the Nationwide permit. If these issues cannot be successfully addressed, we recommend that you require the applicant to apply for an individual Section 404 permit for the proposed activity.

My staff is available to discuss resolution of these issues with you and the applicant. If you have any questions, please call Mr. Thomas Glatzel of my staff at (312) 886-6670.

Sincerely,

Kevin M. Pierard, Chief
Watersheds and Nonpoint Source Programs Branch

cc: U.S. Fish and Wildlife Service, Bloomington IN
Indiana Dept of Environmental Management, Indianapolis IN
Indiana Department of Natural Resources, Indianapolis IN

08/01/97 / DS
8/1/97
8-4-97

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 65

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

C. H. Hall

August 20, 1997

Operations Division
Regulatory Branch (South)
ID No. 199501367-rjs

RECEIVED

AUG 25 1997

Mr. Andrew Short
Peabody Coal Co.
Lynville Business Unit
P.O. 7
Lynville, IN 47619

Dear Mr. Short:

This is in regard to your application requesting authorization for construction of a levee, and surface coal mining and reclamation activities in Warrick County, Indiana. The area is adjacent to Pigeon Creek and is also specified as IDNR Permit No. S-00326, and is also known as the Millersberg II North permit. We have reviewed the submitted data to determine whether a Department of the Army (DA) permit will be required under the provisions of Section 404 of the Clean Water Act.

As stated by Peabody Coal Co. (Peabody) the IDNR permit area includes 68 acres of jurisdictional wetlands. Approximately 50 acres of the wetlands would be disturbed. Of the 50 acres, only 4.6 acres would be in the actual surface mining area, and 23.6 acres would be for areas of surface disturbance in the proposed mining operation (silt basins, ditches, runoff from silt basins, levee). An additional 21.8 acres would be in an area of temporary surface disturbance for a heavy equipment crossing. The disturbance for a heavy equipment crossing was approved by letter dated April 3, 1997, from this office as part of a "Temporary road for moving mining machinery" under 33 CFR 323.4 (Discharges not requiring permits).

To minimize the impacts of the proposed coal mining operation, Peabody has redesigned the mining operation to avoid disturbing 190.8 acres of jurisdictional wetland. This would include areas designated as "habitat area" in the National Conservation agreement for the Northern Copperbelly water snake.

As mitigation for this proposal, Peabody proposes both on and off-site mitigation. There would be 25.0 acres in the off-site mitigation area, and 40.1 acres of wetlands in the on-site area within permit No. S-00326. The wetland type would be of a bottomland hardwood wetland (PFO1B).

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 66

The information supplied by you was distributed to the coordinating agencies in a Pre-Construction Notification (PCN). The responses received within the coordination period were from the U.S. Fish & Wildlife Service, Bloomington, IN, the U.S. Environmental Protection Agency, Chicago, IL. We have also received a response from the Indiana Department of Natural Resources after the comment period ended. Copies of the agency responses have been provided to you earlier.

The agency responses are essentially in four areas, (1) reduction of further impacts by relocation of the levee, (2) detailed mitigation standards for the on and off-site mitigation areas, (3) impacts to endangered species, and (4) requests that a Corps inspector or an independent consultant be used to oversee all phases of the bottomland forest reclamation.

This office has reviewed the information supplied by Peabody for different mining permits proposed for this area, and we appreciate the efforts taken to minimize the impacts to wetland. We would like to ensure the successful completion of the proposed wetland mitigation. We have also reviewed the supplemental information provided by Peabody in their letters dated August 18, 1997, and August 20, 1997.

Based upon our review of the submitted data, the responses to the PCN and provided this activity is authorized by the State of Indiana Surface Mining and Reclamation Program under Title V of the Surface Mining and Control and Reclamation Act of 1977, your proposal would qualify for Nationwide authorization under 33 CFR 330, No. 21 (Surface Coal Mining), as published in the Federal Register, dated December 13, 1996 provided you comply with the enclosed General Conditions and the following Special Conditions:

1. The mitigation plan is part of the reclamation plan approved by the State of Indiana Surface Mining Program for IDNR permit No. S-00326, and any subsequent revisions.
2. Peabody shall construct a minimum of 25 acres of forested bottomland hardwood jurisdictional wetland at the off-site mitigation area, and a minimum of 40 acres of forested bottomland jurisdictional wetland at the on-site area on permit No. S-00326.
3. Peabody shall by January 31, 1998, submit to this office for approval a detailed wetland mitigation plan for both the on-site and off-site mitigation areas. This plan would be in accordance with the "Wetland Compensatory Mitigation and Monitoring Plan Guidelines for Kentucky". Peabody shall make any

May. 2. 2016 3:09PM

US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 67

changes to the plan requested by this office during the review process.

4. Peabody shall agree to contract an outside independent consultant with expertise in wetland mitigation to prepare detailed plans, and provide monitoring/Inspection services to ensure the success of the forested wetland mitigation areas.

This authorization will be effective as soon as we receive your signed acceptance of the conditions. Please sign and date the duplicate copy of this letter in the space provided and return the signed copy in the enclosed envelope. Note that we also perform periodic inspections to ensure compliance with our permit conditions and applicable Federal laws.

If you have any questions, please contact this office by writing to the above address, ATTN: CEORL-OP-FS or by calling Mr. Ronny J. Sadri at (502) 582-5452. Any correspondence on this matter should refer to our ID No. 199501367-rjs.

Sincerely,

ORIGINAL SIGNED

Daniel L. Evans
Chief, South Section
Regulatory Branch

Enclosure

(I accept the conditions of this authorization)

Peabody Coal Co.

Date

May. 2. 2016 3:09PM US ARMY CORP NEWBURGH REGULATORY

No. 0078 P. 68

ADDRESSES FOR COORDINATING AGENCIES

Mr. David Schulenberg
Chief, Wetlands Regulatory Section
WQW-16T
U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

Mr. Dave Hudak
Field Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
620 South Walker Street
Bloomington, Indiana 47403-2121

Mr. Steve Jose
Division of Fish and Wildlife
Department of Natural Resources
402 West Washington Street, Room 273
Indianapolis, Indiana 46204

Mr. David Phillips
Division of Reclamation
Indiana Department of Natural Resources
RR # 2, Box 129
Jasonville, IN 47438

Inspection Crew (Sparks)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAY 10 2016

REPLY TO THE ATTENTION OF:

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

RECEIVED

MAY 17 2016

BY _____

Dear Colonel Beck:

On April 14, 2016, the U.S. Environmental Protection Agency reviewed and commented on the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana.

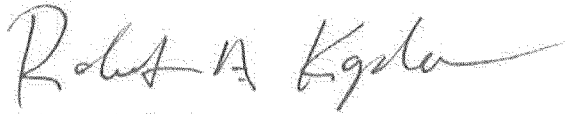
The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service. As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

In the April 14, 2016 letter, the EPA indicated that the proposed project may result in substantial and unacceptable impacts to aquatic resources of national importance (ARNI) in accordance with Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

No additional information has been provided that addresses EPA's concerns. Therefore, pursuant to Part IV, paragraph 3(b) of the August 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army regarding section 404(q) of the CWA, EPA finds that this project, as proposed, will have substantial and unacceptable impacts to aquatic resources of national importance.

Thank you for the opportunity to provide comments on this project. Please contact Wendy Melgin at (312) 886-7745, with any questions you may have.

Sincerely,

A handwritten signature in dark ink, appearing to read "Robert A. Kaplan". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Robert A. Kaplan
Acting Regional Administrator

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)
Scott Pruitt, US Fish and Wildlife Service (via email)
Martha-Clark Mettler, IDEM(via email)
Randy Braun, IDEM (via email)
Jason Randolph, IDEM (via email)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAY 18 2016

REPLY TO THE ATTENTION OF:

WW-16J

RECEIVED

JUN 03 2016

BY _____

Ms. Lee Anne Devine
 Chief, Regulatory Branch
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

Subject: Proposed Seven Hills Mine, Warrick County, Indiana, LRL-2013-635-GJD

Dear Ms. Devine:

This letter is in response to the letter sent to Robert Kaplan, Acting Regional Administrator, from Mr. George DeLancey of your staff on May 11, 2016. Mr. DeLancey requested that the U.S. Environmental Protection Agency provide the U.S. Army Corps of Engineers (Corps) with information to support the 3(b) letter EPA submitted to the Corps on May 10, 2016.

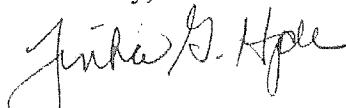
The 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army defines a process and time frames for resolving disputes, in an effort to issue timely permit decisions. Following the process in the MOA, EPA sent the Corps a 3(a) letter on April 14, 2016, within the public comment timeframe. Following the outline of the MOA, within 25 days of the end of the public comment period, the EPA may issue a letter stating that the project will have substantial and unacceptable impacts to an aquatic resource of national importance. EPA did not receive a response from the Corps to our April 14, 2016 letter, or any additional information on the proposed Seven Hills Mine, and subsequently submitted the 3(b) letter on May 10, 2016.

EPA has previously provided information to the Corps supporting the 3(b) determination for the proposed Seven Hills Mine. As Mr. DeLancey noted in his letter, EPA attached detailed comments to the April 14, 2016 letter. Those comments are the culmination of EPA's extensive and thorough review of the proposed project going back to 2013. The comments are based on the application materials, specific onsite resources, proposed impacts, site visits and initial water quality modeling conducted by EPA.

EPA's input and detailed comments throughout the pre-application process, the joint EPA and U.S. Fish and Wildlife Service letter of March 17, 2016, and EPA's April 14, 2016 3(a) letter and attachments, are the basis for EPA's May 10, 2016 3(b) letter and support EPA's opinion on: 1) why there will be substantial and unacceptable impacts to aquatic resources of national importance: Pigeon Creek, its floodplain forested wetlands and the Ohio River; 2) why the specific permit must be denied as proposed to protect aquatic resources of national importance; and 3) how our determination was made. The letters are enclosed.

Please contact Wendy Melgin at (312) 886-7745, if your staff requires additional explanation of EPA's position. We look forward to continuing our coordination with you and the Fish and Wildlife Service on this project.

Sincerely,



Tinka G. Hyde
Director, Water Division

Enclosures

March 17, 2016 USEPA and FWS Letter (w/attachments)

April 14, 2016 USEPA 404 Comment Letter (w/attachments)

cc: George DeLancey, Army Corps of Engineers (via email)
Michael Ricketts, Army Corps of Engineers (via email)
LeAnn Devine, Army Corps of Engineers (via email)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

MAY 10 2016

REPLY TO THE ATTENTION OF:

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

Dear Colonel Beck:

On April 14, 2016, the U.S. Environmental Protection Agency reviewed and commented on the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warren County, Indiana.

The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service. As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

In the April 14, 2016 letter, the EPA indicated that the proposed project may result in substantial and unacceptable impacts to aquatic resources of national importance (ARNI) in accordance with Part IV, paragraph 3(a) of the August 1992 Memorandum of Agreement between the EPA and Department of the Army regarding section 404(q) of the CWA.

No additional information has been provided that addresses EPA's concerns. Therefore, pursuant to Part IV, paragraph 3(b) of the August 1992 Memorandum of Agreement (MOA) between the EPA and the Department of the Army regarding section 404(q) of the CWA, EPA finds that this project, as proposed, will have substantial and unacceptable impacts to aquatic resources of national importance.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
 REGION 5
 77 WEST JACKSON BOULEVARD
 CHICAGO, IL 60604-3590

APR 14 2016

REPLY TO THE ATTENTION OF:

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, Kentucky 40201-0059

Subject: Comments on Public Notice LRL-2013-638-GJD; Proposed Seven Hills Mine,
 Warrick County, Indiana.

Dear Colonel Beck:

The U.S. Environmental Protection Agency has reviewed the above referenced public notice and the related Clean Water Act (CWA) Section 404 permit application for discharges associated with United Minerals' proposed Seven Hills Mine, an approximately 1,700 acre open pit coal mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. The EPA has previously participated in multiple interagency site visits, reviewed and commented on the preliminary plan, and jointly commented on this project with the U.S. Fish and Wildlife Service (FWS) (Enclosure 1). As currently proposed, the project would directly impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water.

Based on our review of the previous and currently available information, and pursuant to Part IV, paragraph 3(a) of the 1992 CWA Section 404(q) Memorandum of Agreement between the EPA and Department of the Army, the EPA is hereby notifying the U.S. Army Corps of Engineers (Corps) that this project may have substantial and unacceptable impacts on aquatic resources of national importance.

The proposed Seven Hills project would mine through over 460 acres of floodplain forested wetlands and 10 miles of streams tributary to Pigeon Creek. From its headwaters, Pigeon Creek flows approximately 50 miles through the project area and bisects downtown Evansville, before joining the Ohio River. The EPA considers Pigeon Creek, its floodplain forested wetlands, and the Ohio River to be aquatic resources of national importance. Project area aquatic resources consist of contiguous tracts of increasingly rare floodplain forested wetlands. These wetlands are diverse and productive systems that are located on floodplains and inundated by flood waters. The Pigeon Creek floodplain forested wetlands filter nutrients, excess sediments and other



MAR 17 2016

WW-16J

Colonel Christopher G. Beck
 District Engineer
 U.S. Army Corps of Engineers
 Louisville District
 P.O. Box 59
 Louisville, KY 40201-0059

Re: United Minerals Company, LLC-Seven Hills Mine LRL-2013-635-GJD

Dear Colonel Beck:

The U.S. Environmental Protection Agency and the U.S. Fish and Wildlife Service (FWS) (the agencies) have reviewed the Clean Water Act (CWA) Section 404 permit application (permit application) materials and the Public Notice for the subject project. The agencies appreciate the efforts by the Louisville District to involve the EPA, FWS and other agency partners in preliminary discussions and reviews of the proposed Seven Hills Mine and other mining activities proposed nearby.

United Minerals Company, LLC (United Minerals) proposes to impact 510.16 acres of wetlands (of which 463.18 acres are forested wetlands), 53,840 linear feet of streams and 72.85 acres of open water, for the construction of the 1,679.6 acre Seven Hills Mine in the Highland-Pigeon Creek watershed southeast of Elberfeld in Warrick County, Indiana. Approximately 648.5 acres of the site have been previously mined and reclaimed in the 1990s and are not proposed to be impacted for coal extraction. Both agencies have commented on the preliminary plan for this mine, and we want to highlight the following comments based on our reviews of the permit application and subsequent Public Notice.

The Seven Hills Mine is immediately west of the recently proposed High Point Mine and the nearby Liberty Mine. These three adjacent mines would cumulatively impact over 100,000 linear feet of streams and 600 acres of wetlands within the Highland-Pigeon Creek watershed. Given the scope and environmental impacts associated with these proposals, the agencies continue to believe that the projects should be evaluated in a coordinated fashion, and that an Environmental Impact Statement (EIS) should be prepared. This would allow for a more comprehensive analysis of cumulative impacts, and consideration of additional practicable alternatives that could meet the project purpose while avoiding and minimizing anticipated significant environmental impacts.

The agencies are concerned that the project's proposed CWA Section 404 discharges may result in unacceptable impacts to Pigeon Creek, its forested floodplain wetlands and tributaries, and

Seven Hills Mine

Impacts	Total Wetlands to be Impacted	Total Avoided Wetlands	Total Forested Wetlands to be Impacted	Total Avoided Forested Wetlands	Total Streams (Linear feet)
Original Application	510.16	289.58	462.18	207.16	53,840
Removed from Impacts	-162.14	162.14	-139.1	139.1	-9,445
“Conditional” Impacts	-140.7	140.7	-139.7	139.7	-10,617
Initial Impact Totals	207.32	592.42	183.38	485.96	33,778